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ABSTRACT

This book is made up of six reading courses in the sciences, each of which is divided into several exercises. Each exercise has an objective and at least one reading selection. In most of the courses, the first objective is to acquaint the student with names and terms used in the subject being discussed. Exercises following the reading selection provide the opportunity to practice the skill presented in the objective. Types of exercises are short answer, matching, true/false, and multiple choice. Course 701 is an introduction to earth science, including air, water, weather, space, and geology. Courses 702, 703, 801, and 802 are about biology and include the study of plants (botany) and animals (zoology). General information about plants and animals is found in course 702, with the major emphasis being on plants. The focus in course 703 is on animals. Course 801 discusses human structures and functions. Course 802 addresses nutrition and a good daily diet for proper health and gives details about some body ailments and diseases. In course 803 the student is given an opportunity to practice drawing conclusions from reading selections about a variety of science-related topics. Information on test-taking techniques is also given. Reviews are found following courses 703 and 803. A pronunciation key and two glossaries are appended. (YLB)

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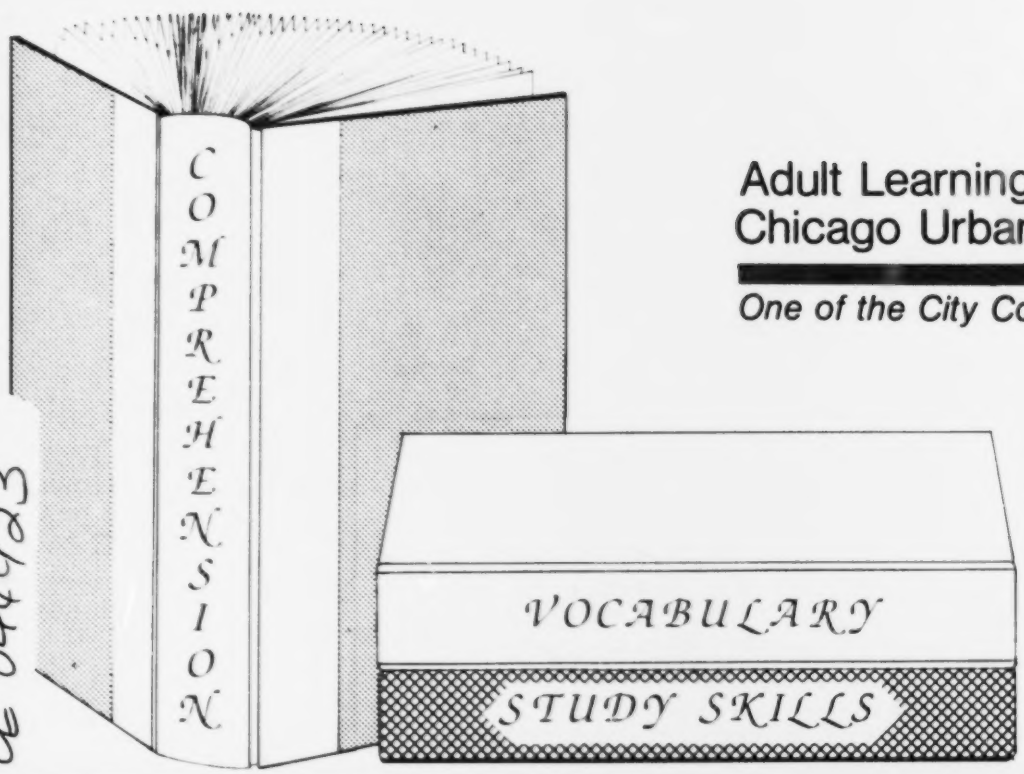
Intermediate Supplemental Exercises

Courses 701 — 803

Science



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ADULT LEARNING SKILLS PROGRAM

Supplemental Exercises

in

READING

Courses 701-803

CHICAGO URBAN SKILLS INSTITUTE

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The exercises in this book and in this series have been designed to provide educational materials in addition to instructional texts. The exercises in the Intermediate Level books were developed in the subject areas by the following:

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ANIMALS: 1419 Copyright-free Illustrations of Mammals, Birds, Fish and Insects, Jim Harter, 1979, Dover Publications, NY

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INTRODUCTION

This book is made up of six courses, 701 through 803. Each course is divided into several exercises. Each exercise has an objective, or goal, and at least one reading selection. In most of the courses, the first objective is to acquaint you with names and terms used in the subject being discussed. After you read a selection, you will have the opportunity to practice using the skill presented in the objective.

Course 701 is an introduction to earth science, which includes air, water, weather, space, and geology.

Courses 702 - 802 are about biology. Biology deals with all aspects of life forms. It includes the study of plants (botany) and animals (zoology). In these courses, you will be introduced to the structures and functions that make up living things. Biology also examines how living things behave and relate to one another.

General information about plants and animals is included in Course 702. The major emphasis, however, is on plants.

The major focus in Course 703 is on animals. Human structures and functions are discussed in Course 801.

Course 802, the final biology course, mainly discusses nutrition and a good daily diet for proper health. It also gives details about some body ailments and diseases.

In Course 803, you are given an opportunity to practice drawing conclusions from reading selections about a variety of science-related topics. You will read and answer questions about test-taking techniques.

At the end of courses 703 and 803 you will be able to check on how well you have mastered skills presented in the preceding exercises. You may find that you have learned them well. There may be some skills that you need to practice more.

A Special Word About Vocabulary: Most key science terms are defined in the sentence in which they appear. However, there are a pronunciation key and two glossaries at the back of this book. One is for courses 701-703 and the other is for courses 801-803. The glossaries contain the words that may be the hardest to pronounce plus a short definition.

If you want to know more about a subject, ask the teacher or a librarian to suggest where you can look for more information. One of the basic reasons for becoming educated is to learn how to find answers for yourself.

We hope you enjoy this book!

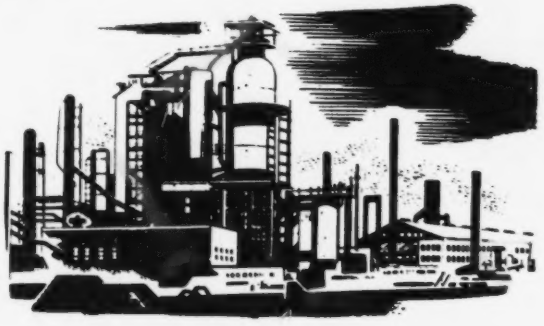
OBJECTIVE: To develop vocabulary related to earth science (air)

The passage below discusses the problem of air pollution and measures that can be taken to clean the air. Read to find out:

1. what pollution actually is
2. the sources of pollution
3. the harm that pollution can do
4. what devices can control it

The underlined words are important vocabulary related to air pollution.

AIR POLLUTION



Cities that have the largest populations are experiencing serious concerns about air pollution. Dirty air causes many health problems. It is especially harmful to people who have breathing difficulties, allergies, or heart problems. Air pollution occurs when hazardous chemicals and foreign materials make the air dirty. Scientists do not know all of the causes of air pollution. But, they have identified a few of them. The exhaust from motor vehicles is one major cause. Another source is the burning of oil and coal for energy. Burning garbage is also a source of air pollution. The fumes from iron, steel, petroleum, and other chemical plants contribute to the problem. The dust, soot, gas, and other impurities from these sources are called pollutants. These pollutants make the air dirty. Smog, a mixture of smoke and fog, is an example of dirty air.

Two devices that help control air pollution are the catalytic converter used on cars and the trap used on smokestacks and incinerators. These are called anti-pollution devices. Anti means "against." Therefore, anti-pollution means fighting against pollution.

Gasoline contains carbon. When gasoline burns, some of the carbon escapes unburned into the air. In this form, it is called carbon monoxide. Carbon monoxide is a poisonous gas. Breathing it can be very dangerous. Most new cars use lead-free gasoline. This gasoline leaves very little unburned carbon. It is very effective when used with a catalytic converter. The catalytic converter is attached to the exhaust system of cars and trucks. This device helps fuel to burn more completely.

The trap catches or traps chemicals before they enter the air. This prevents fumes, soot, gas, and other impurities from becoming pollutants.

Although researchers have found ways to help keep our air clean, we must do our part, too. By observing "No Smoking" signs, using lead-free gas, and not burning trash outside, we can have cleaner air.

A. DIRECTIONS: Match each word on the left with its description on the right.

__	1. air pollution	a.	anti-pollution device for cars
__	2. smog	b.	dirty air
__	3. catalytic converter	c.	anti-pollution device for smokestacks and incinerators
__	4. trap	d.	smoke and fog
__	5. carbon monoxide	e.	poisonous gas

B. DIRECTIONS: Write T if the sentence is true and F if it is false.

__ 1. Some pollutants come from automobile exhaust and from incinerators.

__ 2. Anti-pollution devices help to pollute the air.

__ 3. Many health problems are linked to air pollution.

__ 4. A trap catches impurities before they enter the air.

__ 5. Carbon monoxide is a dangerous gas.

__ 6. Scientists have completely eliminated air pollution.

__ 7. Air pollution is a process of cleaning the air.

__ 8. A catalytic converter can be attached to the exhaust system of cars.

__ 9. Carbon monoxide comes from unburned carbon.

__ 10. Smog helps to cure certain diseases.

OBJECTIVE: To develop vocabulary related to earth science (water)

The passage below discusses the largest bodies of water on earth, the oceans. Read to find out:

1. how much of the earth's surface is made up of the oceans
2. why the oceans are salty
3. how the oceans differ from one another
4. in what ways oceans can provide for mankind

The underlined words are important vocabulary related to the oceans.

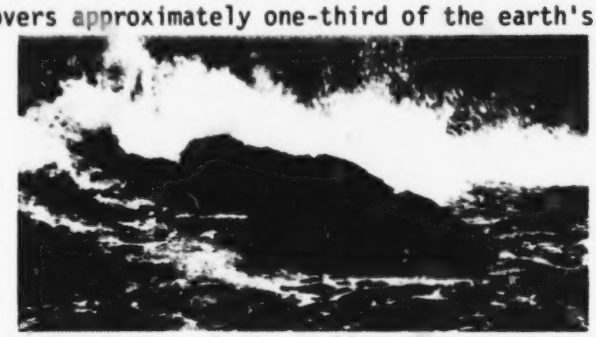
OCEANS OF THE WORLD

All the water on earth is called the hydrosphere. This includes all rivers, lakes, seas, and oceans. The oceans of the world cover a large portion of the earth's surface. Along with bays and seas, they cover approximately 71 percent of the earth's surface.

There are three great oceans of the world. They are the Pacific, Atlantic, and Indian Oceans. There are also two smaller oceans. They are the Arctic and Antarctic Oceans. The Arctic Ocean surrounds the North Pole, and the Antarctic Ocean surrounds the South Pole. Some geographers do not consider these to be separate oceans. They are thought of as just extensions of the Pacific, Atlantic, and Indian Oceans.

All five oceans are salty. The salt comes from dissolved minerals. Some of these minerals come from the ocean floor. The rest come from the water which drains into an ocean from rivers and seas. The more rivers and seas that drain into an ocean, the saltier it is.

All the great oceans have specific characteristics. The Pacific Ocean is the largest and deepest. It covers approximately one-third of the earth's surface. The Atlantic Ocean is the second largest. The river systems and seas from half the world's land area drain into the Atlantic. This process makes the Atlantic the saltiest of all the oceans.



The third largest ocean is the Indian Ocean. It is smaller than the Atlantic and one-half the size of the Pacific.

The oceans of the world play an important part in our lives. They provide food. They also provide water for generating electricity and, when salt is removed, for growing food and drinking.

A. DIRECTIONS: Match each term on the left with its description on the right.

___ 1. Pacific Ocean	a. the saltiest ocean
___ 2. Atlantic Ocean	b. the third largest ocean
___ 3. Antarctic Ocean	c. surrounds the North Pole
___ 4. Arctic Ocean	d. largest and deepest ocean
___ 5. Indian Ocean	e. surrounds the South Pole

B. DIRECTIONS: Write T if the sentence is true and F if it is false.

___ 1. The second largest ocean in the world is the Atlantic.

___ 2. The Indian Ocean is larger than the Pacific Ocean.

___ 3. The Arctic and Antarctic are the two smaller oceans.

___ 4. The hydrosphere is the part of the earth covered with water.

___ 5. Some geographers do not consider the Arctic and Antarctic Ocean as separate oceans.

___ 6. Dissolved minerals help to make the Pacific the saltiest ocean.

___ 7. The Indian Ocean is smaller than the Pacific and Atlantic Oceans.

___ 8. The Pacific Ocean covers about one-third of the earth's surface.

___ 9. The Indian Ocean is one-half the size of the Arctic Ocean.

___ 10. The Arctic and Antarctic Oceans are often thought of as extensions of the Pacific, Atlantic, and Indian Oceans.

OBJECTIVE: To develop vocabulary related to earth science (weather)

The passage below discusses weather, which deals with changes in the atmosphere surrounding the earth. Read to find out:

1. how the earth's water and land work together to affect weather
2. why atmospheric changes can be brought about by the sun
3. what conditions cause the wind to blow
4. what is meant by "the lake effect"

The underlined words are important vocabulary related to the weather.

THE AIR AROUND US

Weather is a combination of wind, moisture, temperature, and air pressure. People who study the weather are called meteorologists. They examine the air currents and air pressure in order to predict the weather.

One of the major sources of weather is the wind. There are certain predictable air patterns called air currents that flow around the earth. The three sources for these air currents are the different temperatures at the poles and equator, the rotation of the earth, and the differences in temperature between earth and water.

Warm air rises. The warmest part of the earth is at the equator. So the air rises the highest at the equator and falls lowest at the poles. That is, the atmosphere extends farther out into space at the equator than at the poles. Air also has weight. The weight of all the air presses down on the air at the surface of the earth. This weight is called air pressure. Thus, the air pressure at the equator is higher than at the poles. An instrument for measuring air pressure is called a barometer.

Like water seeking its own level, air pressure tries to level out. The high pressure over the equator will move to the low pressure over the poles. The high warm air above the equator will move toward the poles. This presses the cold air at the surface of the poles downward to move toward the equator.

Rotation, or the spinning of the earth on its axis, also affects the wind. The earth spins faster than the air that surrounds it. This makes the north-south winds twist and move.

Changes in temperature between the water and land also affect the winds. The light and heat from the sun stay at the surface of the land. Because the ocean is **translucent**, the light is able to go deep into the water and spread throughout the ocean. Much of the sun's heat makes the water evaporate rather than warm up. To **evaporate** means that the water particles become so small they float with the air. Thus, the water's temperature changes slowly while the earth's temperature changes rapidly. These changes heat and cool the air above it. They create small, temporary high and low pressure areas which will eventually affect local wind direction.

As the wind currents go across the ocean, they pick up and carry the evaporated water. As the water **vapor** (water particles in the air) cools, it forms clouds. If it continues to cool, the vapor will once again become water. The water will fall to the earth as rain, snow, or hail which is called **precipitation**. An example of this is the "lake effect" snow that we get here in Chicago. The winds pick up moisture as they move east across Lake Michigan. Since the temperature of the water is much warmer than the land, the moisture in the air freezes and immediately falls back to earth. That is why the south side of Chicago can have a snowstorm while on the north side there is no snow in the air.

DIRECTIONS: Complete each sentence below with one of the following words from the reading selection.

meteorologists	air pressure	translucent	evaporated	weather
precipitation	air currents	barometer	rotation	vapor

1. Water particles in the air are called _____.

2. Water that falls to the earth in the form of rain, snow, or hail is called _____.

3. An instrument for measuring air pressure is called a _____.

4. Certain predictable air patterns that flow around the earth are called _____.

5. People who examine the air currents, temperature, and air pressure to help them predict the weather are called _____.

6. Something that light is able to pass through is _____.

7. Water has _____ when particles of it have become so small that they float with the air.

8. The combination of wind, precipitation, temperature, and air pressure is called _____.

9. The weight of the air in the atmosphere is called _____.

10. The spinning of the earth on its axis is _____.

OBJECTIVE: To develop vocabulary related to earth science (space)

The passage below discusses the star system that we live in. Read to find out:

1. what the bodies moving through space are made of
2. the difference between the solar system and a galaxy
3. what astronomers know about distance
4. how exploring outer space has changed the lives of Earth people

The underlined words are important vocabulary related to the universe.

ASTRONOMY

The universe is made up of all the things that exist in space. The study of the universe is called astronomy. Astronomers are interested in the earth and its relation to the universe.

For us, the universe begins with the earth. The earth is one of the nine planets that revolve around the sun. (See illustration on the next page.) The four planets that circle closest to the sun are Mercury, Venus, Earth, and Mars. These planets are dense, which means they are very heavy and solid. The next four planets are gaseous. That is, they are very light and made of gases and solids. These planets are Jupiter, Saturn, Uranus, and Neptune. Between Mars and Jupiter is a belt of asteroids. Asteroids are rocks floating in space. Some asteroids are as large as islands and many miles in diameter. Others are as small as dust. Some scientists think that these rocks may be the remains of a moon. They think the moon may have exploded for some reason. The ninth planet is Pluto. It is very small and very dense. Some scientists feel that there may even be a tenth planet.

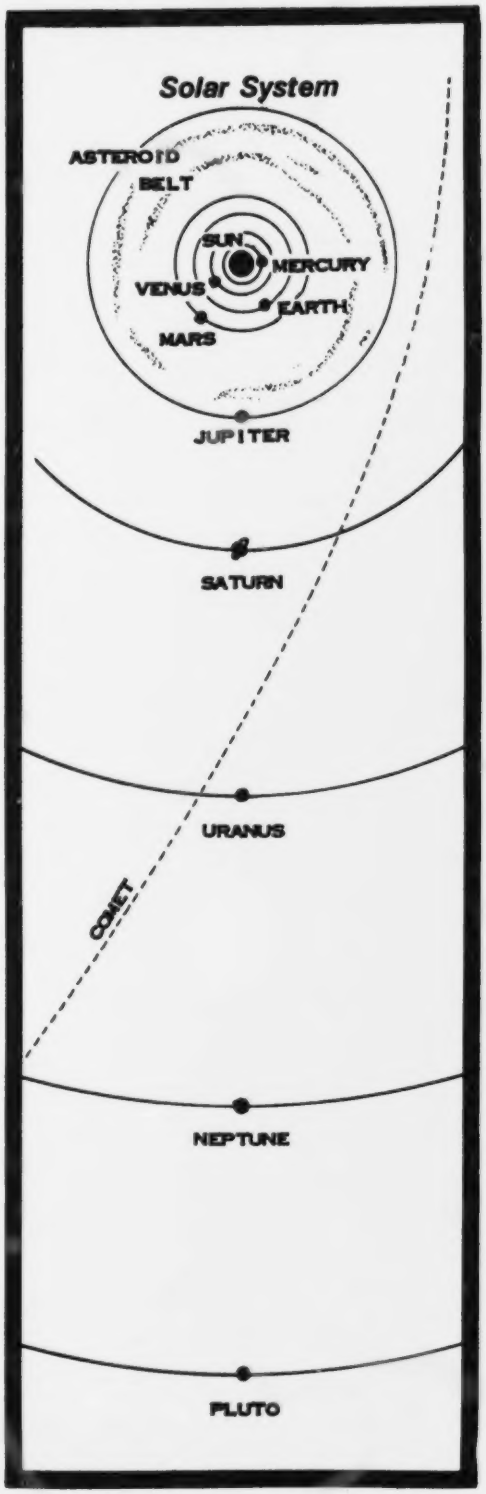
Besides the planets, comets orbit, or go around, our sun. Comets are balls of frozen gases and water, and dust. As they get closer and closer to the sun, the outer layers melt. The gases and dust spread out behind the comet. This gives the comet a tail thousands of miles long. The most famous comet is Halley's comet, which orbits the earth about every 76 years. It is named for the scientist who predicted its next appearance. Halley's comet can be seen on February 5, 1986.

Our sun is a star. It is part of a large group of stars called a galaxy. The name of this galaxy is the Milky Way. On a dark night far from the lights of the city, it looks like a creamy white band of stars across the sky. There are millions and millions of galaxies like the Milky Way in the universe.

The universe is so very large that scientists cannot measure it in miles. Instead, they measure it in light years. A <u>light year</u> is the distance light can travel in one year. Light moves at 186,000 miles per second. The earth is 93,000,000 miles away from the sun. Imagine that the sun suddenly went dark. It would take 500 seconds before we would be aware of what happened.

Astronomers use telescopes to study the universe. They also use spectroscopes to examine the colors in a star's light. The spectroscope uses a prism to analyze the patterns of light. If light goes through a prism, it will show a rainbow of colors. This rainbow of colors is called a <u>spectrum</u>. The light of different stars makes different patterns. Astronomers study a star's spectrum to determine what a star is made of and its speed and direction. Packages of scientific instruments are sent into space. They circle the earth and send down radio messages. Because they circle the earth, they are called <u>satellites</u>.

Exploration of space has benefited people on earth. It has helped to invent new materials. It has greatly improved our communication systems. It has also made it easier to predict the weather.



A. DIRECTIONS: Match the words on the left with their meanings on the right.

____	1. galaxy	a.	very heavy and solid
____	2. spectrum	b.	very light and made of gases
____	3. light year	c.	rocks floating in space
____	4. comets	d.	the distance light can travel in one year
____	5. dense	e.	all the things that exist in space
____	6. gaseous	f.	balls of frozen gas and dust
____	7. asteroids	g.	the study of the universe
____	8. universe	h.	to revolve or go around
____	9. astronomy	i.	rainbow of colors created by a prism
____	10. orbit	j.	a large group of stars

B. DIRECTIONS: Write T if the sentence is true and F if it is false.

____ 1. The universe is measured in miles.

____ 2. Some asteroids are as small as dust.

____ 3. Mercury, Venus, Earth, and Mars are gaseous planets.

____ 4. The Milky Way is an example of a galaxy.

____ 5. Comets orbit the sun.

____ 6. Satellites circle the earth.

____ 7. Jupiter, Saturn, Uranus, and Neptune are planets that are dense.

____ 8. Orbit means to go between something.

____ 9. A light year is the distance light travels in one month.

____ 10. The rainbow of colors in a spectrum is caused by light passing through a prism.

OBJECTIVE: To develop vocabulary related to earth science (geology)

The passage below discusses geology which is the study of the earth and how the surface of the earth changes. Read to find out:

1. the names of the different layers of the earth
2. how pressure in the earth can affect the land
3. how the Continental Drift Theory helps explain this pressure
4. the meaning and effects of erosion

The underlined words are important vocabulary related to geology.

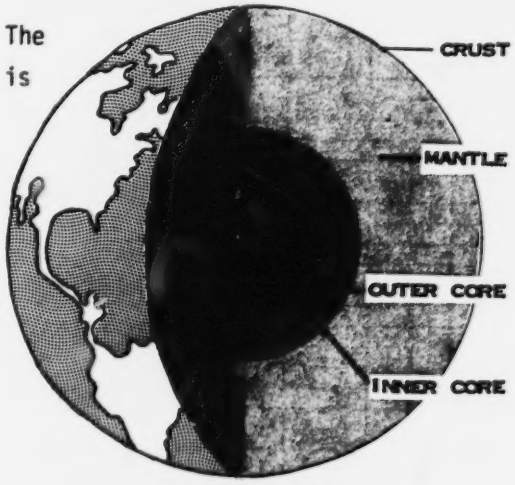
UNDERSTANDING THE EARTH

Geology is the science of the earth. It includes the composition, structure, and history of the land. It can include materials that fall to earth from space or those that are brought back here.

Geologists study the different ways the earth's surface changes. Some changes are caused by the movement of the earth's surface. Others are brought about by volcanoes. Still other changes are caused by erosion. Erosion is the wearing away of the earth's surface by weather, water, or fire.

Layers of the Earth

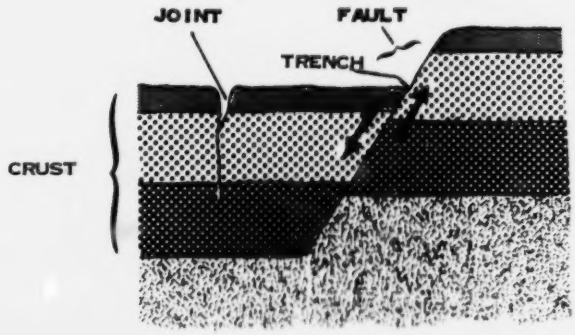
The earth is made of three basic layers. The crust is the solid, rocky outermost layer. It is three to 25 miles thick. The mantle is the layer beneath the crust. It is about 1,800 miles thick. It, too, is rocky. The core is the center of the earth. The outer core is mostly liquid and made up of melted iron and nickel. It is about 1,400 miles thick. The inner core is made up of solid iron and nickel. It is about 1,600 miles in diameter.



Pressure on the Earth

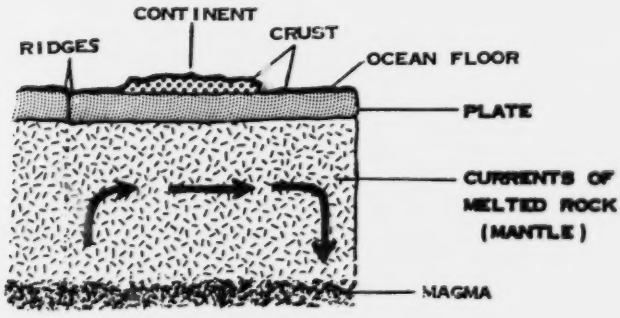
The earth's crust and mantle are under great pressure. The pressure is so great that it can melt rock. Melted rock below the surface is called magma. The magma is pushed out of the earth through volcanoes. Once the melted rock has left the earth, it is called lava. As the lava cools, it creates new land. Some of the land is in the form of a cone like each of the Hawaiian Islands. Other land is in the form of plateaus. Plateaus are high, flat stretches of land.

Great pressure on the earth can also crack rock. A crack in the earth's crust is called a **joint**. If the crust moves up and down along a joint, the position of the crust is called a **fault**. After the rock in the crust breaks, it snaps back to its original position. This is called an **earthquake**.



The Theory of Continental Drift

The Continental Drift Theory helps to explain the pressure on the earth's crust. It says that the earth's crust is made up of ten large plates and many small ones. A **plate** is a large part of the earth's crust and the upper part of the mantle. These plates make up the ocean floors and carry the continents. Between the plates are **ridges**. Magma flows up from the ridges. As the magma cools, it **condenses**, or gets smaller. It then becomes part of a plate. The plates then move away from the ridge. Eventually one plate crushes into another. One plate will be pushed underneath the other. The place where this plate goes down into the earth is called a **trench**. The continents carried by the plates are lightweight. They do not sink into the trench. The collision of the plates pushes the continents together and creates mountains. The Himalaya Mountains were formed when the plate carrying India collided with the plate carrying Asia.



Erosion

Erosion changes the land. Oceans wear away rocks. Wind can move soil from place to place. Streams wash away soil. As the streams empty into lakes or oceans, the soil it carries settles to the ocean floor. Eventually so much soil is dropped, new land builds up. An example of this is the Mississippi Delta.

A. DIRECTIONS: Match each word on the left with its meaning on the right.

____	1. crust	a.	the layer of the earth beneath the crust
____	2. mantle	b.	the center of the earth
____	3. earthquake	c.	the wearing away of the earth's surface from natural forces such as weather and water
____	4. core	d.	the place where the crust moves up and down along the joint
____	5. lava	e.	the outermost layer of the earth
____	6. magma	f.	the place where magma forms the plate
____	7. erosion	g.	a large part of the earth's crust and upper mantle
____	8. plate	h.	rock snapping back to its original positon
____	9. ridge	i.	melted rock below the earth's surface
____	10. fault	j.	melted rock that has left the inside of the earth

B. DIRECTIONS: Fill in the missing word for each description or phrase. Use the underlined words from the reading selection. You may also use proper nouns.

_____ 1. Melted rock that is pushed out of the earth through volcanoes

_____ 2. The study of the earth

_____ 3. This comes out of a ridge and becomes part of the plates

_____ 4. The outer part of this is mostly liquid

_____ 5. The layer of the earth made up of solid iron and nickel

_____ 6. The result of India's collision with Asia

_____ 7. An explanation of the pressure on the earth's crust

_____ 8. High levels of land

_____ 9. Gets smaller

_____ 10. The place where the plate goes down into the earth

OBJECTIVE: To recognize cause and effect relationships

DIRECTIONS: After reading the information below about cause and effect, complete the exercises which follow.

There is an old saying, "One thing leads to another." This is true in a cause and effect relationship. **CAUSE** is the reason for something happening. **EFFECT** is what actually happens. Look for clue words such as the following in cause and effect relationships.

Clue Words

so	because of
when	due to
since	as a result
effect of	consequently

EXAMPLE: As a result of heavy rainfall yesterday, the highway was slippery.

CAUSE: As a result of heavy rainfall yesterday,

EFFECT: the highway was slippery.

A. DIRECTIONS: The following sentences have been divided as shown in the example above. Write **C** in front of the cause and **E** in front of the effect.

1. _____ When rain water seeps down into the ground,

   _____ the water table rises.

2. _____ The humidity is high

   _____ when there is a large amount of water vapor in the air.

3. _____ The air was polluted

   _____ because it was filled with smoke, dust, and other foreign material.

4. _____ Since the temperature in Chicago dropped to 27^{0} below zero on January 25th,

   _____ area hospitals received an influx of patients suffering from frostbite.

5. _____ Forty inches of snow fell on Chicago in twenty-four hours,
_____ so Marsha had to cancel her trip to New York.

6. _____ A lot of people were unable to go to work
_____ due to the tornado.

B. DIRECTIONS: Draw <u>one line</u> under the cause and <u>two lines</u> under the effect in each sentence below.

1. There was a drought in Africa last year due to very little rainfall.

2. O'Hare Airport was closed because of heavy fog.

3. The Atlantic and Pacific Oceans meet and form the Arctic Ocean.

4. When there are hurricanes far out in the ocean and undersea earthquakes, tidal waves occur.

5. The Atlantic is very salty due to dissolved minerals drained into it from half the world's land area.

6. As a result of a blizzard, schools were closed for two days last year.

7. Some people eat natural foods because many commercially produced foods contain preservatives.

8. The effect of India colliding with Asia was the Himalaya Mountains.

9. Because of heavy rainfall, the south side of Chicago was flooded.

10. Due to the velocity of the wind from Hurricane David, the beaches were closed over the weekend.

C. DIRECTIONS: Read the following passage. Then complete each statement by checking (✓) the best answer.

In November, 1981, a severe storm watch was issued for a small southern city. Therefore, families in this city were asked to seek shelter in schools or churches. Some families stayed at home. They boarded up windows, bought candles, and stored food and water. They were prepared for the storm. The storm hit the city in the late afternoon. It lasted several hours. When the storm ended the next morning, there was a lot of damage. Trees, debris, and broken power lines covered the streets. Consequently, homes were left without electricity for several days. The rainwater overflowed the storm drains and mixed in with the sewers. The sewers then overflowed into the drinking water reservoirs and contaminated them. As a result, no one could use tap water. All these conditions together resulted in closing down the city. It did not return to normal for two weeks.

---

1. The problems in this southern city were caused by a

   ____ a. blizzard.
   ____ b. severe storm.
   ____ c. tornado.

2. The sewers overflowed because

   ____ a. the storm drains overflowed into the sewers.
   ____ b. homes were left without electricity.
   ____ c. there was debris in the street.

3. People could not use tap water because

   ____ a. they had boarded up windows.
   ____ b. the faucets were broken.
   ____ c. it was contaminated.

4. The main effect of the storm was that

   ____ a. schools were closed.
   ____ b. the city was shut down.
   ____ c. city streets were blocked.

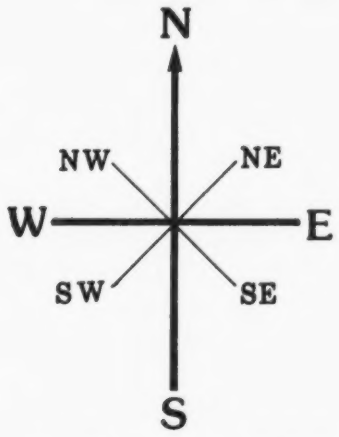
OBJECTIVE: To interpret diagrams

DIRECTIONS: Read the following description of a diagram. Then follow the directions for each exercise.

> A diagram is a plan that shows the parts of something and how they work. An outline of something, a figure, and a chart are examples of a diagram. Usually a diagram has lines or arrows to help you interpret information. Therefore, it is important to follow the lines and arrows.

A. DIRECTIONS: Look at the compass. Read the explanation of the points on the compass below. Then complete the exercise.

> The long lines on a compass show the four main points. These are called the **primary points**. The primary points are **north, south, east, and west.** The four in-between points are indicated by the short lines. They are called the **secondary points**. The secondary points are a combination of two main points. They are **northeast, southeast, northwest** and **southwest.** The diagram below uses initials to represent the directions.



(LEFT) (RIGHT)

1. The four primary points on a compass are

   _____

2. The four secondary compass points are

   _____

3. NW is a symbol that stands for

   _____

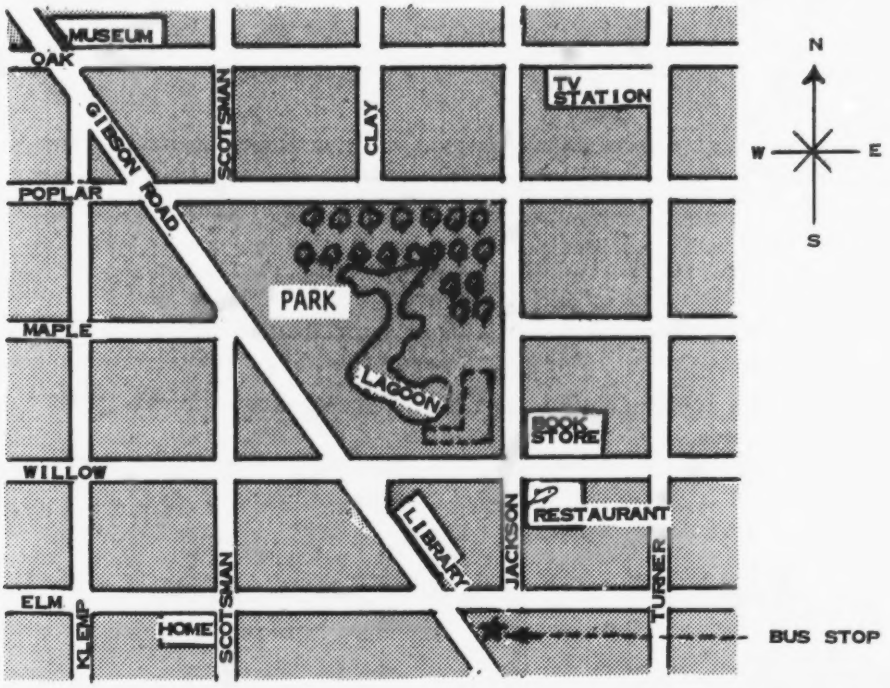
4. The opposite direction of NW is

   _____

5. If you face north, then turn left to the very next compass point, then around and face the opposite direction, what direction are you facing?

A roadmap is a diagram that represents roads and landmarks. The names of the streets are written in. A landmark is something easily seen that may be used as a guide. Major landmarks may be drawn, named, or boxed in.

B. DIRECTIONS: Use the map and the compass to write in or underline the words that fit.



Charles Mark, a GED student, lives near the library where he takes a class. Today, he is going to walk to the bus stop to meet his teacher and classmates. They are going together on the Gibson Road bus to vist a museum where they will see an exhibit about geology. They plan to study different kinds of minerals and rock formations.

1. Mr. Mark's home is located on the corner of _____ and _____.
2. He must cross (two, three) streets to get to his class at the library.

3. Gibson Road is diagonal. It runs from _____ (direction) to _____ (direction).
4. The Gibson Road bus to the museum will travel _____ (direction).
5. A friend of Mr. Mark borrowed a book from the library. He liked it so well that he decided to buy a copy for himself. He asked Mr. Mark how to get to the bookstore.

   Mr. Mark told him the bookstore was on _____ (street). He said it was across the street from a seafood restaurant. The big fish-shaped sign was a _____ that the friend was told to look for.
6. The local TV station invited Mr. Mark's teacher to talk about the GED classes after the news. The teacher planned to walk from his job at the bookstore to the TV station.

   He would walk _____ blocks.
7. What is the most direct route from the bookstore to the bus stop? Go _____ (direction) on _____ (street) and turn _____ (direction) on _____ (street).
8. How does one get from the TV station to the museum? Go _____ (direction) on _____ (street).
9. Walk out of the restaurant and go one block east. You are now standing on the corner of _____ and _____. If you walk three blocks north, you will be close to _____ (landmark).
10. Scotsman is not a "through street". It is interrupted by _____ (landmark).

The wind is all around us. It is the air moving across the surface of the earth. Winds are described by their name, direction and/or speed. A wind vane is used to show wind direction. The Beaufort Scale is one way to estimate wind speed. The direction and speed of the wind help a weatherman predict the weather.

C. **DIRECTIONS:** Study the following scale. Then complete the exercise which follows.

BEAUFORT WIND SCALE

Beaufort number	Name	Miles Per Hour	Effect On Land
0	Calm	less than 1	Calm; smoke rises vertically.
1	Light Air	1-3	Weather vanes inactive; smoke drifts with air.
2	Light Breeze	4-7	Weather vanes active; wind felt on face; leaves rustle.
3	Gentle Breeze	8-12	Leaves and small twigs move; light flags extend.
4	Moderate Breeze	13-18	Small branches sway; dust and loose paper blow about.
5	Fresh Breeze	19-24	Small trees sway; waves break on inland waters.
6	Strong Breeze	25-31	Large branches sway; umbrellas difficult to use.
7	Moderate Gale	32-38	Whole trees sway; difficult to walk against wind.
8	Fresh Gale	39-46	Twigs broken off trees; very difficult to walk against wind.
9	Strong Gale	47-54	Slight damage to buildings; shingles blow off roofs.
10	Whole Gale	55-63	Trees uprooted; considerable damage to buildings.
11	Storm	64-73	Widespread damage; very rare occurrence.
12-17	Hurricane	74 and above	Violent destruction.

SOURCE: The World Book Encyclopedia Vol. 21. Chicago: Field Enterprises Educational Corporation, pg. 279.

DIRECTIONS: Use the Beaufort Wind Scale to answer each of the following questions. Place a checkmark next to the correct answer.

1. How many miles per hour does a strong breeze travel?

___ a. 25 - 31
___ b. 19 - 24
___ c. 32 - 38
___ d. 39 - 48

2. Winds that sway small trees are the effects of what type of wind?

___ a. calm
___ b. fresh breeze
___ c. strong gale
___ d. storm

3. What is the Beaufort number of a strong gale?

___ a. 5
___ b. 2
___ c. 10
___ d. 9

4. What do winds clocked at 58 miles per hour indicate?

___ a. hurricane
___ b. storm
___ c. whole gale
___ d. gale

5. What type of wind causes violent destruction?

___ a. a fresh gale
___ b. a strong gale
___ c. a hurricane
___ d. none of the above

OBJECTIVE: To develop vocabulary related to general biology

The following passage discusses the classification of living things. Read to find out:

1. the similarities and differences among living things
2. the major groups of living things
3. how the classification system began
4. the levels in the classification system

The underlined words are important vocabulary related to classification.

THE CLASSIFICATION SYSTEM

Living things have much in common. They are all made up of protoplasm. They respond to **stimuli** (e.g., heat, cold, light). They take in food and use it for nourishment and growth. This is called **assimilation**. Another characteristic of living things is **elimination**. This means getting rid of waste. Living things also have offspring. They can make copies of themselves. Yet, this **reproduction** process is different from one life form to another.

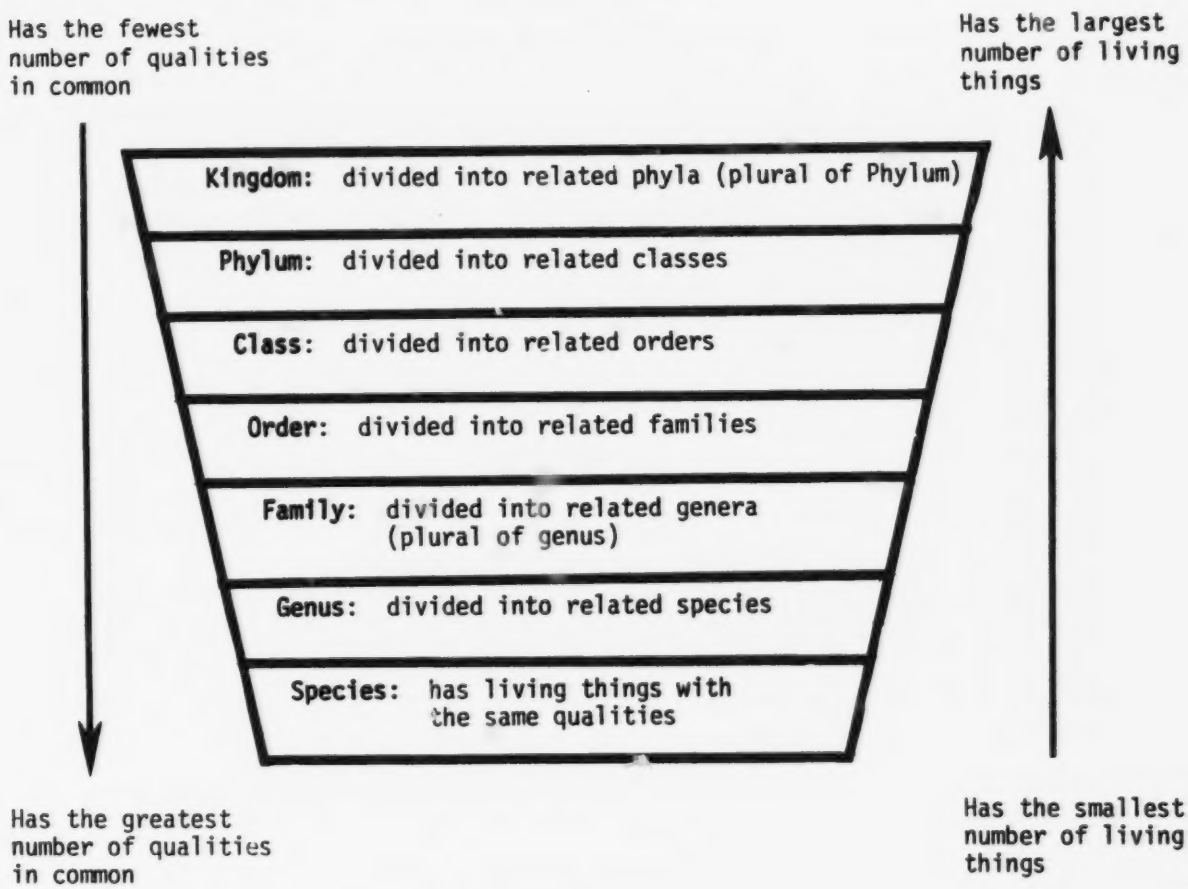
Although living things are alike in many ways, they are also vastly different. Some can repair or replace worn out or damaged parts of themselves (**regeneration**) while others cannot. Some are capable of **locomotion** (moving about by themselves) while other are not. In science, life forms are sorted by their similarities and differences.

Biologists divide living things into three groups. Before life forms can be sorted into groups, however, their structures and systems must be studied. Then, once named and grouped, they can be remembered more easily. The main groups are plants and animals. The third group is protists. **Protists** have characteristics of both plants and animals.

Over two centuries ago, a biologist designed a system for classifying all living things. His name was Carolus Linnaeus. He was a very careful observer of nature. By noticing the qualities of various living things, he saw that many were alike. Others were totally different. For example, some plants had seeds while others had only spores. He put those things with the same qualities into the same group. He called each group a **species**. Some of these species varied in only a few qualities. He put all the species that varied slightly into a larger group. He called this group a **genus**.

To further understand Linnaeus' naming system, let's look at the term **homo sapiens**. It is the scientific name for humans. Notice that it has two parts. The first part of the term is the genus name, **Homo**. It means "man." The second part of the term is the species name, **sapiens**. It means "wise" or "the ability to think."

As the groups varied more and more, Linnaeus placed them into larger categories. He ended up with two very large groups or **kingdoms**. One group was called the **Plant Kingdom**. The other group was called the **Animal Kingdom**.


Has the fewest number of qualities in common
Has the largest number of living things
Kingdom: divided into related phyla (plural of Phylum)
Phylum: divided into related classes
Class: divided into related orders
Order: divided into related families
Family: divided into related genera (plural of genus)
Genus: divided into related species
Species: has living things with the same qualities
Has the greatest number of qualities in common
Has the smallest number of living things

A. DIRECTIONS: Write **true** or **false** before each statement below.

_____ 1. A **kingdom** has the largest number of any group of plants or animals.

_____ 2. As you move down the levels in the classification system, the number of plants and animals in each group gets larger.

_____ 3. Human beings are in the **Homo** species.

_____ 4. **Homo sapiens** have the ability to think.

_____ 5. A **genus** is a specific group of living things with the same characteristics.

B. DIRECTIONS: Complete each sentence below with one of the following words from the introduction on page iv and from the reading selection on the classification system.

assimilation	**reproduction**	**regeneration**	**elimination**	**locomotion**
botany	**zoology**	**biology**	**protista**	**classification**

1. _____ is the study of living things.
2. The study of plant life is _____.
3. The branch of biology which deals with animals is _____.
4. _____ is an area of biology which consists of organisms with characteristics of both plants and animals.
5. The system for arranging plants and animals into kingdoms, phyla, class, order, family, genus, and species is called _____.
6. Plants and animals have offspring because they are capable of _____.
7. _____ is the process by which waste is disposed.
8. Animals are capable of _____ but plants are not.
9. Through _____ some living things can replace damaged parts of themselves.
10. _____ is the process by which food becomes part of a living thing.

OBJECTIVE: To develop vocabulary related to botany (plants)

The following passage discusses the basic unit of all life forms, the cells. Read to find out:

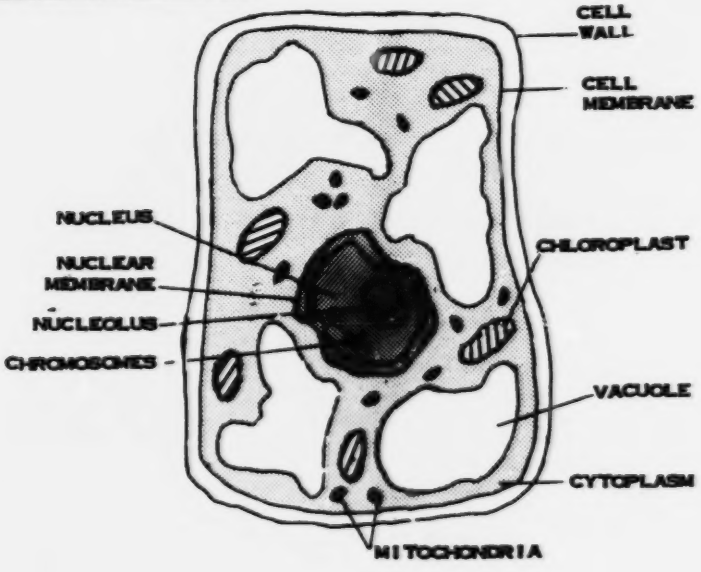
1. how the tiniest parts of the body are similar to the body itself
2. the structure and function of cells
3. how plant cells differ from animal cells
4. what keeps the cells functioning

The underlined words are important vocabulary related to the cell.

THE PLANT CELL: HOW IT DIFFERS FROM THE ANIMAL CELL

Cells are the building blocks of all living things. They perform many functions that human beings perform. They breathe, take in food, and eliminate waste. They also grow, reproduce, and die. Plant and animal cells come in different shapes and sizes. They differ according to their functions and structures. There are three main structures that both plant and animal cells are composed of. These are the nucleus, cytoplasm, and the cell membrane.

A TYPICAL PLANT CELL



The **nucleus** directs most of the cell's activities. It contains the nucleoplasm, nucleolus, and chromosomes. **Nucleoplasm** is a type of protoplasm, the basic living, jellylike substance in the cell. The **nucleolus** controls the processing of proteins. **Chromosomes** are threadlike bodies that carry genes which determine heredity. The genes contain **DNA** (deoxyribonucleic acid). Because DNA acts as a blueprint for the cell, chromosomes can produce new cells with the same structures as the parent cell. DNA determines characteristics of a cell by regulating the manufacture of **RNA** (ribonucleic acid). RNA, found throughout the cell, carries out DNA's instructions for making protein. The kind of protein that is made depends on the kind of living being the cell is part of and what the cell is supposed to do.

The **cell membrane** is the outer part of the cell. It determines what enters and leaves the cell. Within the membrane is **cytoplasm**. This jellylike substance contains **vacuoles**, or **sacs**. These act as a storage area for food and water. The vacuoles in the plant cell are very large. In the animal cell, however, they are quite small. **Mitochondria** are also in the cytoplasm. They are the powerhouses of the cell. They supply the energy the cell needs.

Unlike the animal cell, the plant cell has a **cell wall**. This outer part of the cell is very tough. It protects and supports the cell. Many layers of cell wall form the mass we know as wood.

The main difference between the plant and animal cells is that the plant cell can make its own food. **Chlorophyll** enables the plant cell to do this. Chlorophyll is produced by green particles call **chloroplasts**. Since the animal cell does not have chloroplasts, it cannot make its own food. The process of making food in the plant cell is called **photosynthesis**.

Although cells cannot be seen with the naked eye, they are not necessarily "out of sight, out of mind." Everything that plant and animal cells take in affects their ability to function and survive.

A. DIRECTIONS: Complete each sentence below with one of the following words.

photosynthesis	**cells**	**mitochondria**	**vacuoles**	**cell wall**
cytoplasm	**DNA**	**nucleolus**	**nucleus**	**chlorophyll**

1. The _____ acts as the control station for all of the cell's activities.

2. _____ is the blueprint for reproduction of the cell.

3. _____ are sacs that store food and water.

4. _____ is the process of making food in plants.

5. _____ is the substance in chloroplasts which aids the plant in making food.

6. The _____ controls the processing of proteins in the nucleus.

7. In the plant cell, the _____ protects and supports the cell.

8. _____ are the building blocks for all living things.

9. Cytoplasm contains _____ which release energy.

10. The jellylike substance within the cell membrane is called _____.

B. DIRECTIONS: Write **true** or **false** before each statement below.

_____ 1. Animal cells have all of the structures that plant cells have.

_____ 2. Animal cells do not carry on photosynthesis.

_____ 3. The cell membrane, cytoplasm, and nucleus make up the cells of all living things.

_____ 4. DNA gives RNA instructions for making protein.

_____ 5. Without the nucleus, life in the cell would not exist.

_____ 6. Cells perform many of the same functions that human beings perform.

_____ 7. Wood is the result of an accumulation of cell walls.

_____ 8. Cells can be seen without a microscope.

_____ 9. Vacuoles control what enters and leaves the animal cell.

_____ 10. Chromosomes make possible the reproduction of the cell.

OBJECTIVE: To develop vocabulary related to botany (plants)

The following passage discusses the two main ways that cells reproduce. Read to find out:

1. how cells are formed
2. the method of reproduction that needs only one parent (mitosis)
3. the method of reproduction that requires two parents, male and female (meiosis)

The underlined words are important vocabulary related to cell division.

CELL DIVISION

All living things are composed of at least one cell. Each cell was formed from only one parent cell through a process called **cell division**. With this process each cell grows to its full size and divides into two new cells. Cells reproduce in two main ways. The process that has just been described is called **mitosis**, or asexual reproduction. The other way is **meiosis**, or sexual reproduction.

Mitosis

Most one-celled organisms such as bacteria, yeast, and mold reproduce by mitosis. Also, most cells in the human body and multi-cellular plants and animals reproduce using this method.

During mitosis, a parent cell divides to form two new cells. Each new cell is like the parent cell. There are chromosomes made up of genes in each of these cells. When a cell is ready to divide, each gene splits and becomes two identical genes. Because of this, each of the two new cells receives a complete set of the same genes. Genes are made of DNA. DNA is coded in a specific way for each individual cell that will develop in the offspring. In a plant, a cell may be coded to develop as part of a root, stem, leaf, or flower.

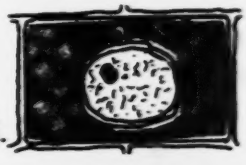
1. 

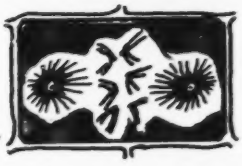
Diagram 1 is an example of a fully developed plant cell, ready to divide.

2.

In 2, chromosomes can be seen. As mitosis begins, they double. Here they are shown doubled.

3.

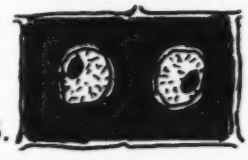
A pole forms at each end of the nucleus. The nuclear membrane begins to disappear. (See 3)

4. 

In 4, the pairs of chromosomes have lined up and begun to move apart.

5.

The chromosomes are moving apart along clear strands of protoplasm in 5. One of each kind of chromosome moves to each end of the cell.

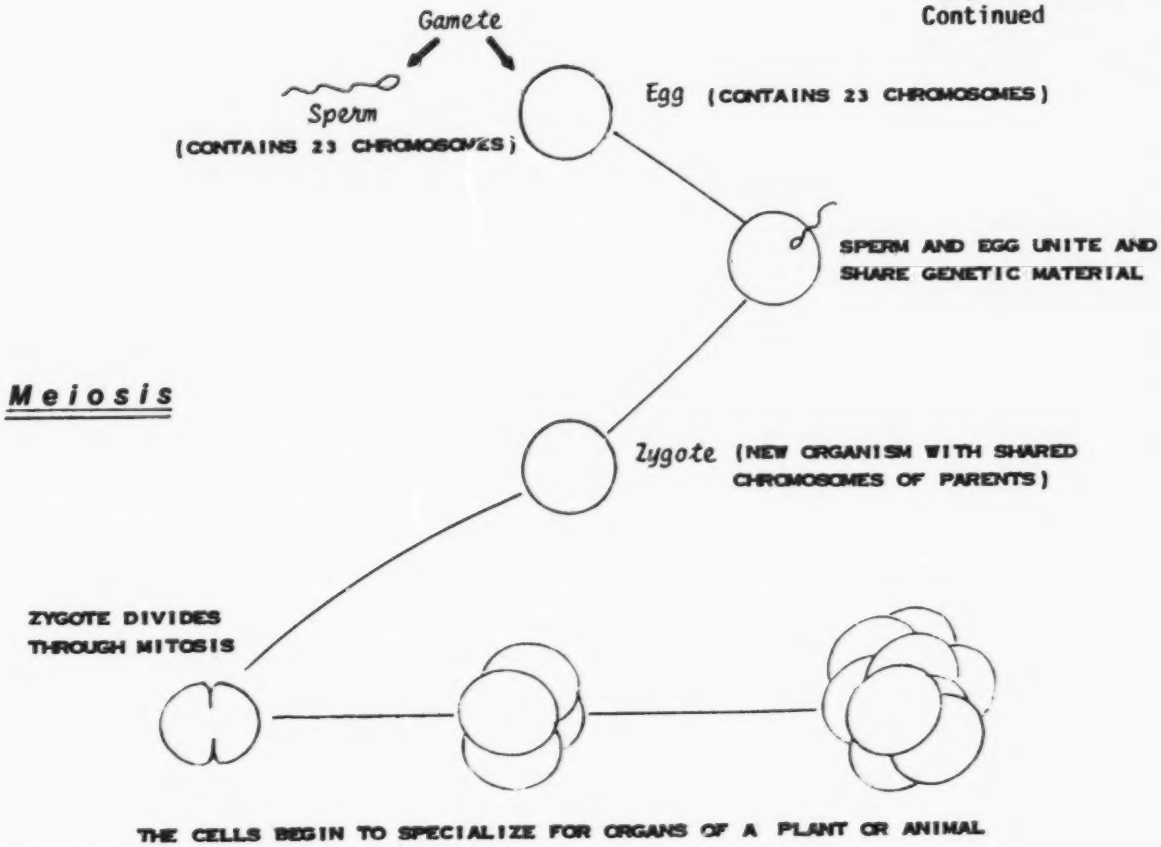
6. 

In 6, the chromosomes have once again become thin and formed parts of new nuclei. A new cell wall has formed. Two new cells now exist where there was once only one.

Meiosis

When cells reproduce during meiosis, the new cells are a combination of half the female parent's chromosomes and half the male parent's chromosomes. The result is a new individual. That new individual is similar to his parents, but not identical.

In order for meiosis to take place, the organism must create special cells. These cells contain only half the chromosomes that a normal cell would have. (See the diagram on the next page.) This special reproduction cell is called a **gamete**. In a male, the gamete is called a **sperm**. In a female, the gamete is called an **egg**. A normal cell in a human has 46 chromosomes. However, in the sperm there are only 23 chromosomes and 23 in the egg. When the sperm and egg unite, the chromosomes from each parent combine to form a new cell with 46 chromosomes. The new cell is called the **zygote**. The zygote then continues to divide. The new cells specialize to form different organs. When the organs are fully developed, the new organism is ready to be born from the female parent.


Gamete
Sperm
(CONTAINS 23 CHROMOSOMES)
Egg (CONTAINS 23 CHROMOSOMES)
SPERM AND EGG UNITE AND SHARE GENETIC MATERIAL
Meiosis
Zygote (NEW ORGANISM WITH SHARED CHROMOSOMES OF PARENTS)
ZYGOTE DIVIDES THROUGH MITOSIS
THE CELLS BEGIN TO SPECIALIZE FOR ORGANS OF A PLANT OR ANIMAL

DIRECTIONS: Write **true** or **false** before each statement below.

_____ 1. All living organisms have one or more cells.

_____ 2. A synonym for "sexual reproduction" is "mitosis."

_____ 3. A gamete is a mature male or female reproduction cell.

_____ 4. A zygote is a cell produced by the union of a male and female gamete.

_____ 5. When a cell divides during mitosis, each of the two new cells receives a complete set of genes.

_____ 6. Meiosis occurs when a single cell divides into two new cells.

_____ 7. Both a female and a male parent is needed before meiosis can take place.

_____ 8. Bacteria and yeast reproduce by meiosis.

OBJECTIVE: To develop vocabulary related to botany (plants)

The following passage discusses the importance of sunlight in the manufacturing of food by plants. Read to find out:

1. what photosynthesis is
2. how the structures in a leaf function
3. how chlorophyll and light interact
4. the role of photosynthesis in the cycle of nature

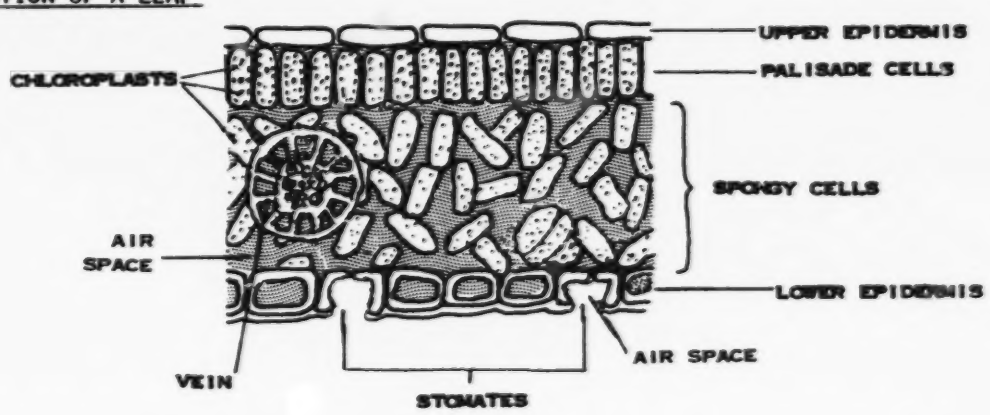
The underlined words are important vocabulary in the study of photosynthesis.

PHOTOSYNTHESIS IN GREEN PLANTS

If you know the meaning of the root words in **photosynthesis**, you can almost guess what happens in green plants. **Photo** means "light." **Synthesis** means "making something complex from simple parts." That complex "something" is sugar. The whole word indicates that something is being made by means of light. The plant uses the sun's energy to mix carbon dioxide from the air with water and nutrients from the soil. Thus, it creates sugar and oxygen. In short, photosynthesis is the process by which plants use the sun's energy to make food and give off oxygen.

Observe the cross section of a leaf below. It has a **vein** through which water and minerals pass to and from the leaf. It also has special cells. The upper and lower layers of cells (the "skin") are called the **epidermis**. It protects the leaf and controls the amount of water the leaf loses.

CROSS SECTION OF A LEAF



In the lower epidermis of a leaf are tiny openings called **stomates**. They enable carbon dioxide to enter the leaf. They also allow unused water to escape into the atmosphere. This passage of unused water is call **transpiration**. The cells just below the upper epidermis are called **palisades**. The loosely packed cells below the palisades are **spongy**. Both the palisades and spongy cells contain small particles called **chloroplasts**. These chloroplasts contain a green substance called chlorophyll.

When chlorophyll absorbs light, it can change water to its basic elements. These are hydrogen and oxygen. The oxygen is released from the plant into the air as waste. The hydrogen is used to convert carbon dioxide into sugar. The sugar is then changed into nutrients. Most plant cells cannot make chlorophyll without light. This is why most plants kept away from light have yellow or white leaves. Eventually, they will die unless they are exposed to light.

Have you ever thought about the role of photosynthesis in the **cycle of nature?** This cycle connects all living things either directly or indirectly. The sun is the most important element in this cycle. Plants rely on it to make food. Plants release oxygen while making their own food. We depend on this oxygen to give us air. We also depend on plants and animals for food. We exhale carbon dioxide which plants unite with the sun's energy. They also unite it with water and nutrients from the soil. This union enables the plants to make more food. When the plants and animals decay, they supply nutrients to the soil. These nutrients are then recycled. Considering all this, you could say that photosynthesis makes life possible on earth.

A. DIRECTIONS: Fill in the correct word for each description. Choose from the words below.

chloroplasts	**epidermis**	**transpiration**	**palisade cells**
spongy cells	**stomates**	**vein**	**synthesis**

_____ 1. Making something complex from simple parts.

_____ 2. Cells just below the upper epidermis. They contain chloroplasts.

_____ 3. Tiny openings in the lower epidermis. They allow carbon dioxide to enter and excess water to escape from the leaf.

_____ 4. Cells which provide protection for the leaf and control the amount of water the leaf loses.

_____ 5. Loosely packed cells which contain chloroplasts.

_____ 6. The passage of unused water from a plant into the atmosphere.

_____ 7. A passageway for water and minerals to and from the leaf.

_____ 8. Small particles which hold chlorophyll.

B. DIRECTIONS: Circle the letter of the correct answer to complete each statement.

1. The most important element in the cycle of nature is:

   a. water b. oxygen c. sunlight

2. The cycle of nature links:

   a. all living things b. non-living things c. mostly simple plants

3. Most plants kept away from light will develop:

   a. fruit b. yellow or white leaves c. green leaves

4. During photosynthesis, hydrogen helps change:

   a. carbon dioxide to sugar b. oxygen to carbon c. water to oxygen

5. The two basic elements of water are:

   a. air and heat b. hydrogen and oxygen c. oxygen and carbon

OBJECTIVE: To develop vocabulary related to botany (plants)

The following passage discusses the make-up of a flowering plant. Read to find out:

1. what percentage of all plants are flowering plants
2. the functions of the four main parts of a flowering plant
3. the functions of the reproductive parts of a flowering plant

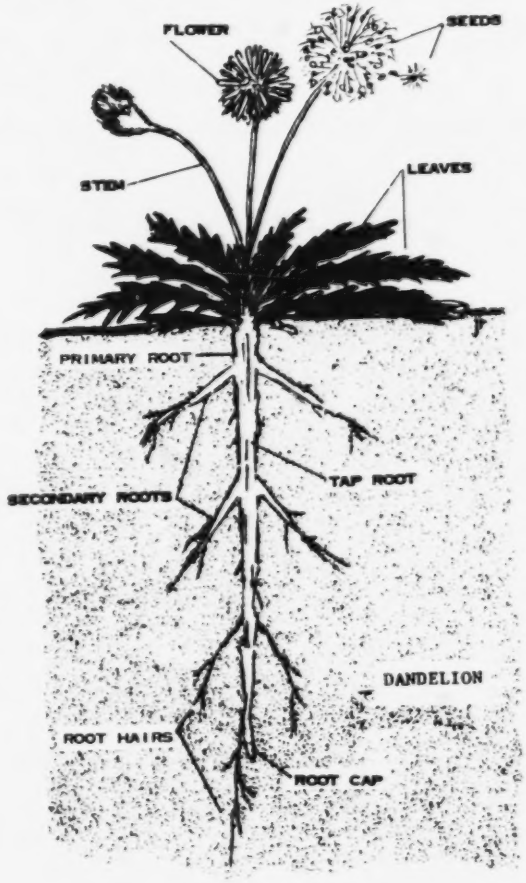
The underlined words are important vocabulary related to flowering plants.

STRUCTURE OF FLOWERING PLANTS

Flowering plants are those plants that produce seeds, fruit, and flowers. At least half of the plants on earth are included in this group. The fruits and vegetables that we eat, the grain from which bread is made, and most of the trees around us are examples of flowering plants.

Flowering plants are composed of four main parts. They are the stems, roots, leaves, and flowers. All parts work together to absorb water and nutrients, release waste, produce fruit, and form seeds for the next generation of plants.

Stems act as the support system for a plant. They lift the leaves so that they can get air and sunlight more easily. To observe this, place a plant on its side. Within a few days the stems will bend upward toward the light. Stems transport water from the roots to the leaves through a system of veins. They then carry food manufactured by the leaves to the rest of the plant.



Roots anchor a plant into the ground. They grow in different directions in search of water and nutrients. There are two basic kinds of root systems. One is the **tap root** which is found on plants such as carrots and dandelions. Some trees also have tap roots. Plants with this kind of root system have one large root that grows downward and smaller roots which grow in all directions. The other root system is made up of **fibrous roots.** A plant such as grass with a fibrous root system has numerous slender roots that grow in all directions.

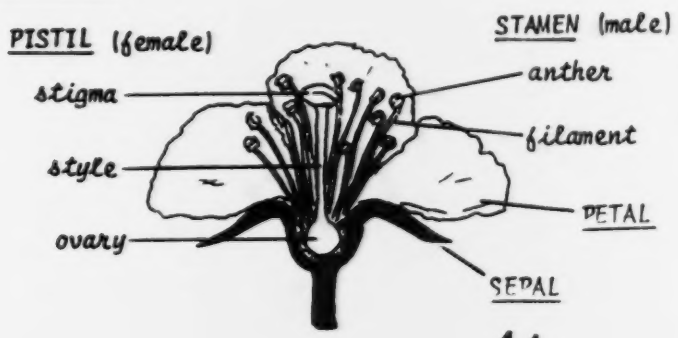
The **primary root** is the main root. It branches off into **secondary roots**. Each root contains a root cap and root hairs. The **root cap** protects a root's tip. The **root hairs** absorb water and nutrients from the soil. Root hairs are extremely fragile and therefore do not last very long. For this reason, some new roots form every growing season. This supplies the growing plant with more root hairs.

Leaves are the food manufacturing part of a plant. They receive water from the stem through a system of veins. Leaves absorb light from the sun and carbon dioxide from the air. Using water, carbon dioxide, and light, the leaves make food. As you have already learned, this process is called photosynthesis.

Flowers are the reproductive organs of a plant. They produce the fruit which houses a plant's seeds. There are four main parts of a flower. (See the diagram below.) They are the sepals, petals, pistil, and stamens. **Sepals** are the leaflike, outermost structures located in a circle at the base of the flower. They are usually green and carry on photosynthesis. Their basic function is to protect the reproductive organs of a flower. Within the circle of the sepals are the **petals** which give a flower its bright color. They, too, protect the reproductive organs.

The **pistil** is the bulblike center portion of a flower that produces the female egg. It is composed of four parts. The sticky top is called the **stigma**. The **style** is the slender neck of the pistil which connects the stigma to the **ovary**. The ovary is the bulblike part at the base of the pistil which contains **ovules** or developed seeds. The male reproductive organ is the **stamen**. Each stamen has an **anther** and a filament. The filament supports the anther which produces the pollen grains containing the male sperm.

FLOWER REPRODUCTIVE ORGANS



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A. DIRECTIONS: Complete each sentence with the best word from the following group.

flowering plants	**secondary roots**	**primary root**	**tap root**
fibrous roots	**root hairs**	**stems**	
roots	**root cap**	**ovary**	

1. The _____ protects the delicate tip of a root.
2. _____ act as a support system for a plant.
3. _____ act as an anchorage system for a plant.
4. _____ produce seeds, fruit, and flowers.
5. The _____ is the most important root of a plant.
6. _____ are roots which have branched off from the main root.
7. The _____ is one large root which grows downward with smaller roots growing in all directions.
8. _____ belong to the root system which grass is made of.
9. An _____ contains a plant's developed seeds.
10. _____ are tiny structures on secondary roots which absorb water and nutrients from the soil.

B. DIRECTIONS: Complete the following sentences using the words below.

petals	**anther**	**pistil**	**ovary**	**sepals**

1. _____ carry out photosynthesis and protect the pistil and the stamen.
2. The _____ is the female reproductive organ of a flower.
3. The _____ is that part of the male reproductive organ which produces pollen.
4. The _____ is that part of the pistil which contains developed seeds.
5. _____ are responsible for the bright color in most flowering plants.

OBJECTIVE: To develop vocabulary related to botany (plants)

In the previous passage you were introduced to the parts of a flowering plant. In this passage you will learn:

1. the difference between self-pollination and cross-pollination
2. how the parts of a flowering plant work together to produce a new plant
3. the growth process of a flowering plant

The underlined words are important vocabulary related to pollination.

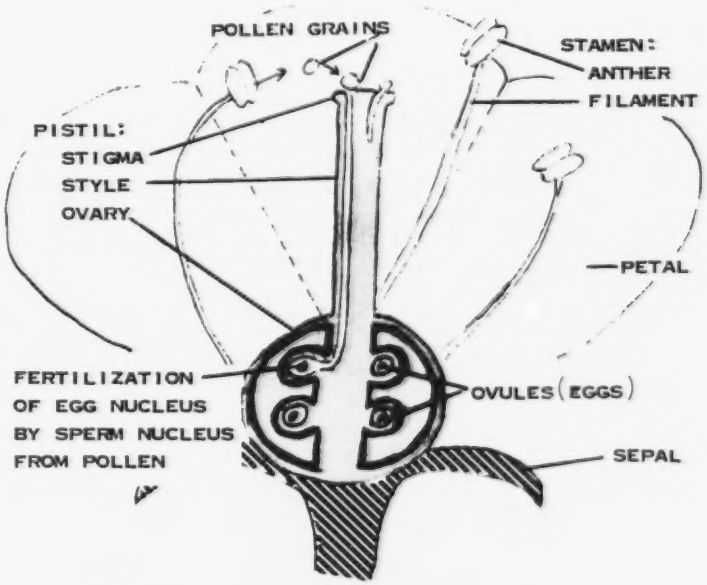
SEXUAL REPRODUCTION IN FLOWERING PLANTS

Pollination

Sexual reproduction begins with pollination. **Pollination** is the process by which male sex cells (pollen) are transported to the female sex cells (ovules). When the sperm of the male cell unites with the egg of the female cell, **fertilization** takes place.

There are two kinds of pollination. One is **self-pollination**. During this process, powderlike grains of pollen travel from the stamen to the pistil of the same flower. Another is **cross-pollination**. When this occurs, pollen from the stamen of one flower is carried to the pistil of another flower by the wind and animals. Since many cross-pollinated flowers have a sweet smell, insects are easily drawn to them. As the insects travel from flower to flower looking for food, they transfer pollen that is stuck to their bodies.

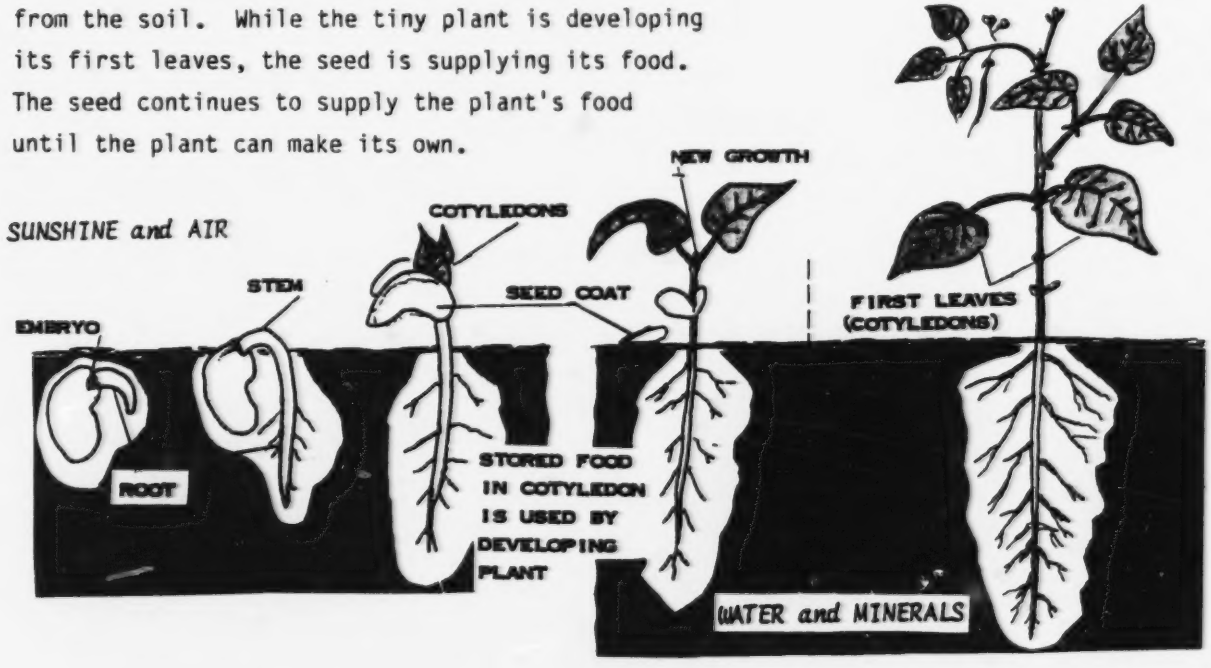
During pollination, pollen grains first land on the stigma. Then they travel down a tube in the style until they reach the ovary. Here, a male sperm from the pollen unites with a female egg. (See the diagram on the right.) Once the egg is fertilized, it grows into a seed. This seed can develop into a new plant.



Germination

After pollination has occurred in flowering plants, the seeds fall to the ground. Each seed contains an embryo which can develop into a new plant. When a seed starts sprouting in the soil, **germination** begins.

Before it can germinate, a seed must have oxygen, water, and the proper temperature. It begins its growth process by absorbing water. The water softens the seed and causes it to swell. The swelling causes the seed coat to split. An **embryo** (young plant) appears. The embryo soon emerges from the seed coat in the form of seed leaves known as **cotyledons**. The seed leaves grow upward while roots grow downward. The roots anchor the seed in the soil, and absorb water and nutrients from the soil. While the tiny plant is developing its first leaves, the seed is supplying its food. The seed continues to supply the plant's food until the plant can make its own.



A. DIRECTIONS: Write the best word which fits each description.

_____ 1. The sprouting of a seed in the soil.

_____ 2. The union of a male sperm and a female egg.

_____ 3. The transporting of pollen to the ovules.

_____ 4. The first leaves which develop from an embryo.

_____ 5. The transporting of pollen from the stamen to the pistil of the same flower.

_____ 6. The process by which pollen from the stamen of one flower is carried to the pistil of another flower.

B. DIRECTIONS: Answer the following questions.

1. How is pollen transported from the stamen of one flower to the pistil of another flower?

_____

2. What part of the pistil does the pollen come in contact with first?

_____

3. How do you think an insect such as a bee will react to a plant with an unpleasant odor?

_____

4. What will probably happen to a seed without the proper oxygen, water, or temperature?

_____

OBJECTIVE: To develop vocabulary related to botany (plants)

You have learned that reproduction is the process by which plants and animals produce new individuals. You also learned that the two chief methods of reproduction are sexual and asexual. In this passage you will learn about the various ways that plants reproduce asexually. Read to find out:

1. the form of reproduction that most one-celled plants use
2. suitable conditions for mold to reproduce
3. what may be the most efficient method of growing plants

ASEXUAL REPRODUCTION IN PLANTS

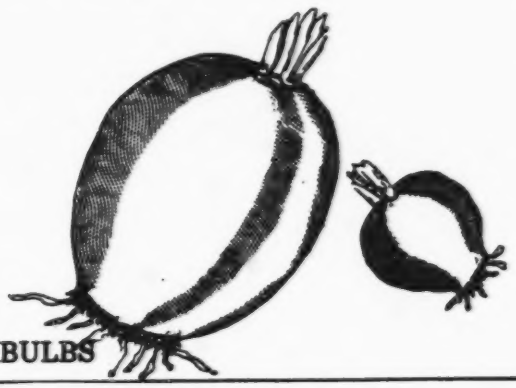
The simplest method of asexual reproduction is **fission**. Most one-celled plants reproduce by fission. This takes place when one parent cell divides into two identical new cells. The new cells will grow to be about the size of the parent cell. Then each new cell will divide. Bacteria is an example of a simple plant which reproduces by fission.

Another way that cells reproduce asexually is by **budding**. When budding occurs, a new cell grows out of the parent cell in the form of a lump or bud. It usually grows about the size of the parent cell. Before long, the bud splits and breaks away from the parent cell. Yeast is a simple plant which reproduces by budding.

A third method that plants use to reproduce asexually is by forming spores. **Spores** are tiny, one-celled structures that develop on simple plants such as mushrooms and mold. Spores grow in firm cases. The cases enable them to survive unsuitable conditions. When the spores ripen, the cases split and the spores fall out. Each spore cell can then develop into a new cell. Sometimes spores grow into new plants right away. At other times, they will wait until the conditions around them are more suitable. For example, mold will grow more rapidly on bread when it is in a damp, warm area.

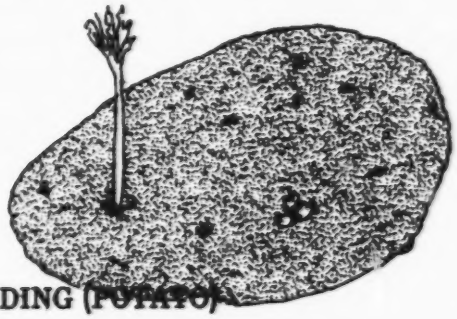
Vegetative propagation is also a method of asexual reproduction. This process involves growing new plants from parts. These parts may be roots, stems, leaves, or flowers. White potatoes, strawberries, onions, and many of the plants you grow at home can be started by vegetative propagation. (See the drawings on the next page.)

For propagation to begin in a potato plant, the potato has to be cut into several parts. Each part with eyes, or **buds**, should develop into a new potato plant. Plants such as strawberries have long stems, or **runners**, that grow along the ground either just above or below it. When a bud from the stem touches the ground, new roots appear. These new roots will eventually produce a new plant. Plants with bulbs can also be propagated. A **bulb** is an underground bud with a short stem and fleshy leaves. The leaves serve as a storage area for food needed for the bulb. Onions, tulips, and beets are examples of plants that grow from bulbs. Growing plants from plant sections called **cuttings** is a form of vegetative propagation. When they are put into water or moist soil, the cuttings first grow roots. They then grow into a new plant.

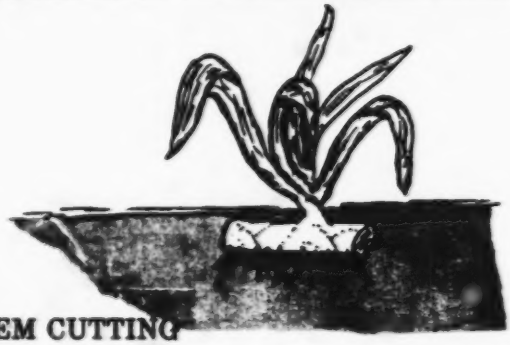


BULBS

RUNNERS



BUDDING (POTATO)



STEM CUTTING

Vegetative propagation may be the best way to grow plants since plants grown using this method reproduce more quickly and easily than those grown from seeds. For example, a potato crop started from seeds would take about two years to produce whereas a potato crop started from buds will produce in about a year. Furthermore, plants grown using this method are more likely to duplicate the qualities of the parent plant than are those grown from seeds.

A. DIRECTIONS: Complete each sentence below with one of the underlined words from the reading selection.

1. Most single-celled plants produce copies of themselves by a process called _____. When this occurs, a parent cell divides into two new identical cells continously.
2. During _____ a new cell grows out of the parent cell in the form of a lump.
3. _____ is growing new plants from stems, leaves, roots, or flowers.
4. Molds reproduce by forming _____.
5. Strawberry plants have long stems called _____ that grow just above or below the ground.
6. A bud which grows under the ground with a short stem and fleshy leaves is called a _____.
7. Before a part of a white potato can grow into a new potato plant, it must have _____ or buds.

B. DIRECTIONS: Write **true** or **false** below each statement.

_____ 1. Molds reproduce by vegetative means.

_____ 2. Fission is the simplest form of asexual reproduction.

_____ 3. Bacteria reproduce by budding.

_____ 4. Tough cases help spores to survive unfavorable conditions.

_____ 5. Dry, cold conditions are most favorable for the growth of mold.

_____ 6. Strawberries grow from bulbs.

_____ 7. Plants started from seeds usually take longer to reproduce than plants started from plant seeds.

OBJECTIVE: To develop vocabulary related to botany (plants)

The following passage discusses the lower forms of plant life. Read to find out:

1. why some scientists have difficulty grouping organisms like algae, bacteria, and fungi
2. the kinds of algae and their usefulness and harmfulness
3. the kinds of fungi and their usefulness and harmfulness
4. what helpful as well as harmful bacteria can do

The underlined words are important vocabulary related to simple plants.

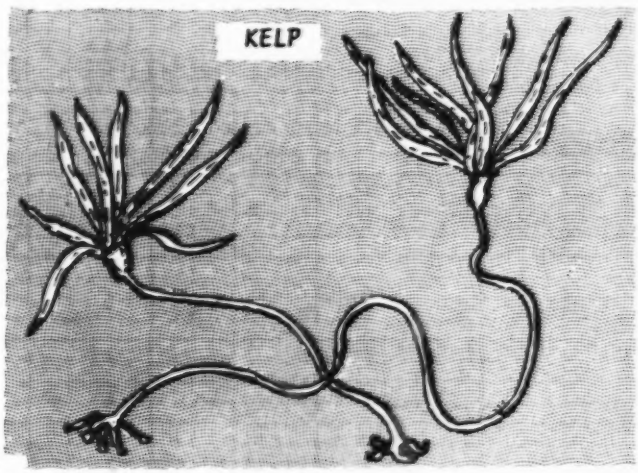
THE PLANT KINGDOM: LOWER FORMS OF PLANT LIFE

The plant kingdom is composed of simple as well as complex classes of plants. The most **primitive** plants are algae, bacteria, and fungi. These plants, which were among the earliest, belong to the subkingdom **Thallophyta**. They are called **thallophytes. Thall** means "rootless, stemless, and leafless." **Phyta** means "plant." Thallophytes vary in size. Some are tiny, one-celled, microscopic plants like bacteria. Others, like seaweed, are multi-celled, very large, and grow in clusters. They usually grow best in damp or dark areas. Because they have characteristics of both plants and animals, some scientists think of them as **protists.**

Simple Green Plants

Green plants contain chlorophyll. As a result, they can manufacture their own food. The simplest kind of green plants are **algae**. They live mainly in water. Some algae survive on energy from the sun just as complex plants do. One-celled algae move around like very simple animals with whiplike parts called **flagella.**

Algae are identified by their color. A common kind of algae is the green algae that sometimes form a scum on the surface of water. The largest kind, brown algae, usually grows attached to rocks along the shore. Kelp is an example of brown algae. A third kind of algae is red algae. They usually grow on the bottom of the ocean. The redness in these algae is said to have given the Red Sea its color.

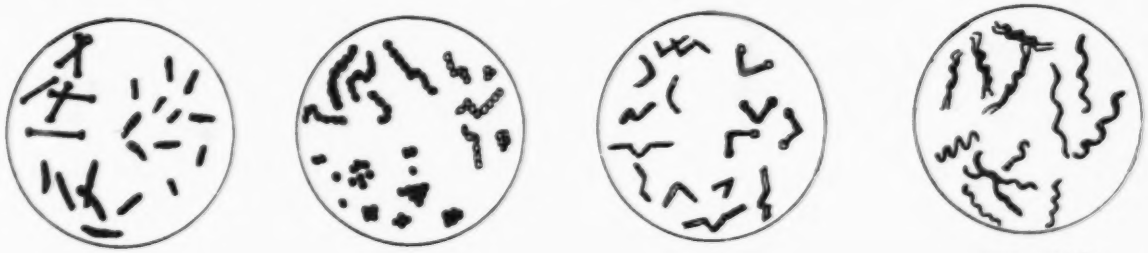


Algae can be useful as well as harmful. Green algae are used as food by fish and other animals that live in water. Brown and red algae are used as fertilizers because of their high mineral content. Some algae are also used in making cosmetics. In some countries, algae such as seaweed are used as food. Algae have been known to cause water pollution. They can also congest the seashore when there is an abundance of them.

Simple Nongreen Plants

Bacteria are the smallest of the one-celled organisms. They are so small that thousands of them can fit into a space as tiny as the head of a pin. They cannot make their own food. These nongreen plants cannot be seen with the naked eye. However, they can be seen with a microscope. It is impossible to avoid bacteria because they are found everywhere. They live in the food we eat, in the air we breathe, and in the water we drink. Bacteria are also found on and in our bodies.

There are four main kinds of bacteria. They are bacilli, cocci, vibrios, and spirilla. Bacteria are grouped according to shape. **Bacilli** are rod-shaped whereas **cocci** are round-shaped, chainlike clusters. **Vibrios** have the shape of bent rods while **spirilla** have the shape of spirals. (See the shapes below.)



Although bacteria are usually thought of as being harmful, they have many useful purposes. For example, they are used in making foods like cottage cheese, yogurt, buttermilk, and vinegar. They are also used in making medicines. Helpful bacteria break down plants and animals by causing them to decay. They are then returned to the soil to be used later by living plants and animals. Bacteria in this group are called **decomposers**. Other bacteria supply nitrogen to plants. They do this by taking nitgrogen from the air. They then convert it into protein to be used by green plants. Harmful bacteria, however, cause food spoilage and poisoning and tooth decay. They can also cause infections and serious diseases such as pneumonia, tuberculosis, and syphilis.

Another group of nongreen plants is fungi. Like bacteria, **fungi** cannot make their own food because they do not have chlorophyll. Instead, many of them rely on dead organisms for their food. There are many kinds of fungi. They may be harmful as well as beneficial.

One kind of fungus, **mold**, grows on old bread, rotten fruit, and other foods. It can develop on the skin in the form of ringworms and athlete's foot. Mold is used in making cheese. It is also used in making penicillin, an antibiotic which kills or stops the growth of harmful germs.

Another kind of fungus is the **mildew** that grows on damp clothing. Once it develops, it leaves permanent stains. Yeast that's used for baking and in making alcoholic beverages is a fungus. **Mushrooms** are also fungi. You should avoid eating mushrooms that you pick yourself because they may be poisonous. Eat only those mushrooms sold in stores or at farmstands.

A. DIRECTIONS: Write the best word for each description below. Use the underlined words in the reading selection.

_____ 1. The subkingdom of plants to which algae, fungi, and bacteria belong.

_____ 2. A word which describes living things that were among the earliest to exist on earth.

_____ 3. Thin, whiplike structures which aid certain one-celled organisms in moving about.

_____ 4. A type of fungus used in making cheese and penicillin.

_____ 5. A type of fungus which causes dough to rise.

_____ 6. Protists that manufacture their own food.

_____ 7. Bacteria which break down dead organisms by causing them to decay and then recycling them.

_____ 8. A type of fungus which grows on damp clothing.

_____ 9. A word which means without roots, stems, or leaves.

_____ 10. Plants that form scum on the surface of water.

B. DIRECTIONS: Write **true** or **false** before each statement below.

_____ 1. All thallophytes are too small to be seen without a microscope.

_____ 2. Bacteria are the smallest of the one-celled nongreen plants.

_____ 3. Bacteria are grouped by their shape.

_____ 4. Some fungi can be eaten as food.

_____ 5. All bacteria are harmful.

OBJECTIVE: To compare and contrast information

When ideas are compared or contrasted, certain words are used to point out their similarities or differences. Some of these words are listed in the box below.

COMPARISON WORDS	CONTRAST WORDS
to	but
also	unlike
like	while
both	whereas
the same as	although
as well as	on the other hand
similar to	however

DIRECTIONS: Two things are being compared or contrasted in each of the following sentences. Write S before sentences if the two things are similar and D if they are different.

_____ 1. Bark protects trees the same as skin protects animals.

_____ 2. Unlike algae, fungi cannot make their own food.

_____ 3. Both algae and fungi make up a lichen.

_____ 4. A dicot seed has two parts whereas a monocot seed has only one part.

_____ 5. Both mosses and ferns have no true roots, leaves, or stems.

_____ 6. Like a botanist, a horticulturist works with plants.

_____ 7. If too much water enters a cell, the cell may swell and burst. On the other hand, if too much water leaves a cell, the cell may shrink.

_____ 8. Plants, as well as animals, are living things.

_____ 9. The stem supports a clover in much the same way that a trunk supports a tree.

_____10. While some plants survive on moisture alone, others need moisture and nutrients.

OBJECTIVE: To compare and contrast information

The following passage discusses plants with a system of veins and those without a system of veins. Read to find out:

1. the difference between vascular and nonvascular plants
2. the method of reproduction for complex plants
3. the structure of plants with one seed and those whose seed is divided in two

The underlined words are important vocabulary related to complex plants.

THE PLANT KINGDOM: HIGHER FORMS OF PLANT LIFE

(1) Plants make up 70 percent of all living things. They live on the ground, in water, and on other plants. Although there are thousands of plants, there are two main phyla of higher plants. Each of these is divided into smaller groups according to their structure and function.

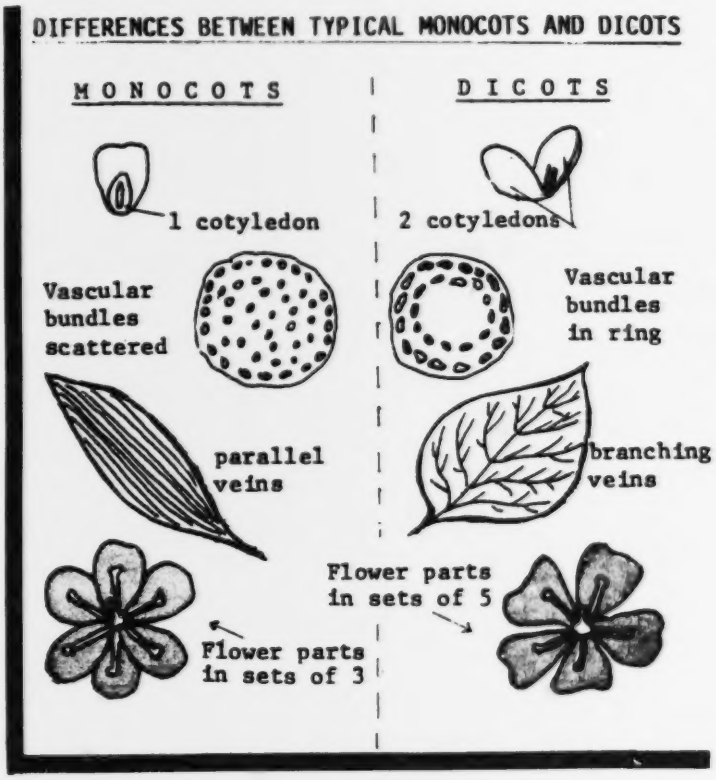
(2) The two main phyla of higher plants are **Phylum Bryophyta** and **Phylum Tracheophyta**. **Tracheophytes** have vascular tissue. This tissue, which has a system of veins, contains cells that carry water and nutrients to the plant. **Bryophytes**, on the other hand, do not have veins. For this reason, they are called **nonvascular** plants.

(3) Nonvascular plants are among the simplest form of plants. They were the earliest plants to adapt to living on dry land. Liverworts and true mosses fall into this group. Bryophytes got their name from the word **bryon** which means "moss." Because they lack true roots, stems, or leaves, these plants do not have a system for carrying water or food. However, they do have common structures called **rhizoids** which are similar to the roots, stems, or leaves in vascular plants. The rhizoids that cling to trees, rocks, and soil allow moisture to enter the plants. Nonvascular plants produce spores instead of seeds.

(4) Tracheophytes, or **vascular** plants, got their name from the word **trachea** which means "tube." Water is carried from one part of the plant to another through a system of tubelike veins. These plants reproduce either by flower seeds or cones.

(5) The two main groups of vascular plants are gymnosperm and angiosperm. **Gymnosperm** means "uncovered seed" as the meaning of the root words **gymno** and **sperm** indicate. Plants in the gymnosperm group are called **conifers**. They have naked seeds and needle-shaped leaves and reproduce by cones rather than by flower seeds. They are usually plentiful in areas with mild temperatures. Pine, redwood, and cedar trees are all called conifers.

(6) Plants in the **angiosperm** group have covered seeds as the meaning of the root words **angio** and **sperm** indicate. They are called flowering plants and are protected inside a fruit. This is the most highly developed group of plants. Peach trees, tomatoes, cotton plants, stalks of corn, and most other plants are angiosperms.



(7) Angiosperms are divided even further according to structure. For example, if a plant's seed has one part, like a kernel of corn, it is called a monocot. However, if it has two halves, like the seed inside a peach pit, it is a dicot. Monocots and dicots also differ according to the veins of their leaves and the number of petals on their flowers. The veins on a monocot leaf are parallel and run the length of the leaf. But the veins on a dicot branch out. Petals on a monocot flower, like the orchid, grow in multiples of three whereas the petals on a dicot flower grow in multiples of either four or five.

A. DIRECTIONS: What two things or groups are being compared or contrasted in the paragraphs indicated below?

Paragraph 2

1. _____

Paragraphs 3 and 4

2. _____

Paragraphs 5 and 6

3. _____

Paragraph 7

4. _____

B. DIRECTIONS: Answer the following questions.

1. How are bryophytes different from tracheophytes?

   _____

   _____

2. How are nonvascular plants similar to vascular plants?

   _____

   _____

3. Compare the ways that vascular and nonvascular plants get moisture.

   _____

   _____

4. How are the seeds in gymnosperms different from those in angiosperms?

   _____

   _____

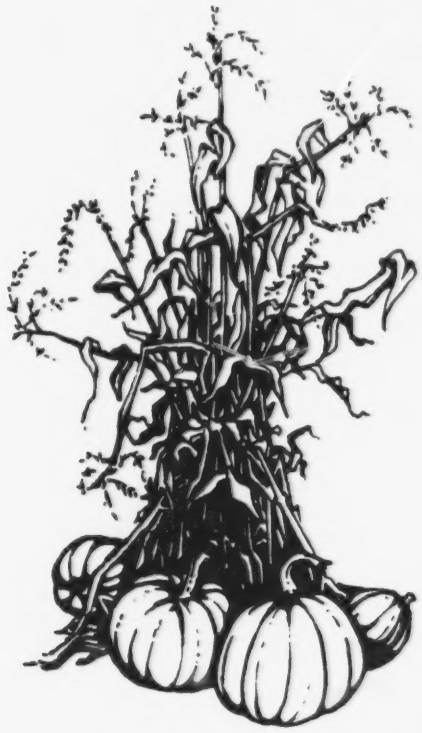
5. Do vascular and nonvascular plants reproduce the same way? Explain your answer.

   _____

   _____

C. DIRECTIONS: Complete the chart to compare and contrast the structure of angiosperms.

PLANT	KIND OF SEED	KIND OF LEAF VEINS	KIND OF PETALS
Monocot	a. _____	c. _____ d. _____	f. _____
Dicot	b. _____	e. _____	g. _____



OBJECTIVE: To interpret information from charts

DIRECTIONS: After reading the general information below, study the chart. Then complete the exercises which follow.

A **chart** or a table is made up of words and numbers arranged in columns and rows. These columns and rows are labeled for identification. They also contain words which describe each label.

A **title** tells the general purpose of the chart. The title usually appears above the chart in capital letters.

A **category** is a group or series of items that has something in common. A group of citrus fruits (oranges, grapefruit, lemons) is an example of a category. Categories are usually the labels on a chart.

A **column** is a category that appears vertically (up and down) on a chart.

A **row** is a category that appears horizontally (across) on a chart.

Data are information about items in a category. Words can be used to describe the category. Numbers can also be used to show amounts or percentages within the category.

PLANTING CHART

PLANT	WHEN TO PLANT	WATERING CARE	HARVEST
BEANS	When soil is at least 65°.	Soak ground.	When pods are 3" long.
BEETS	As soon as the soil can be worked.	Water frequently.	When beets reach 1" in diameter.
COLLARDS	In early summer.	Water frequently.	When the inner leaves are about the size of a hand.
LETTUCE	After the last frost.	Water lightly.	When the heads feel firm.
TOMATOES	Start indoors in late winter; transplant after last frost.	Water deeply every 10 days.	When fruit is bright red.

A. DIRECTIONS: Use the Planting Chart on the previous page to answer the following questions.

1. What is the best summary for the chart? Check the answer from the choices below. (Note: A good summary includes the title, the important categories, and the data on a chart.)

_____ a. Every plant has a different watering schedule.

_____ b. Plants must be planted all at the same time.

_____ c. As soon as the soil can be worked, beets should be planted, then watered, and harvested when the fruit is bright red.

_____ d. Plants differ by the time to plant them, how to care for them, and when to harvest them.

2. When do you harvest tomatoes? _____

3. What kind of watering is needed for lettuce? _____

4. When do you plant lettuce? _____

5. What plants should be watered frequently? _____

6. When do you harvest collards? _____

7. How many columns are in the chart? _____

8. What plant can be planted in June? _____

9. When do you harvest beans? _____

10. What plant can be started indoors? _____

B. DIRECTIONS: Study the chart below. Then write **true** or **false** before each statement which follows it.

CAUSES AND CURES OF COMMON PLANT PROBLEMS

PROBLEM	CAUSE	CURE
Plant has yellow or white leaves.	Lack of light; overwatering	Move closer to a window.
Plant has brown or wilted leaves.	Not enough moisture.	Increase watering and mist leaves.
Plant has holes in leaves.	Beetles, snails, or worms have been on plant.	Use commercial insecticide.
There is a weblike trail on leaf surface.	Larvae entered leaves and are eating just under the surface.	Pick off infested leaves. Use commercial insecticide.
Plant stems are breaking off at the ground level.	Cutworms like caterpillars have been on plant.	Wrap a collar of tar paper around stem about an inch above and below ground.

_____ 1. White leaves can be a sign of overwatering.

_____ 2. Brown leaves indicate that the plant is not receiving enough light.

_____ 3. Holes in leaves indicate that a beetle, snail, or worm is eating a plant.

_____ 4. Cutworms leaves a weblike trail in the leaf.

_____ 5. Wrapping a collar of tar paper around the stems gets rid of brown leaves.

_____ 6. A wilted plant is not getting enough water.

_____ 7. Insecticides leave holes in a plant.

_____ 8. Cutworms cause stems near the ground to break off.

_____ 9. Insecticides can be used to cure two of a plant's problems.

_____10. Moving a plant closer to a window may eliminate yellow leaves.

C. **DIRECTIONS:** Study the chart and complete the statements that follow it.

USES OF SOME PLANTS*

Microscopic sea plants	Basic food for fish
Seaweed and other algae	Food for fish and people Source of agar-agar, a vegetable gelatin used in some foods and drugs Source of algin, an emulsifying agent (causes droplets of a liquid to be suspended in another liquid) in some beverages and drugs; also used as a stabilizer in ice cream
Mosses and lichens	"Reindeer moss" used as food by Arctic animals Sphagnum moss used as surgical dressings and packing for plant materials
Flowering seed plants (angiosperms)	Food, shelter, drugs, fuel, manufacturing

*Adapted from chart in Comptons's Encyclopedia and Fact-Index, 1977, page 378.

1. A simple green plant food that fish eat is made up of _____.
2. Surgical dressings are sometimes made from a plant named _____.
3. Some beverages require emulsifying agent called _____.
4. Plants whose parts provide housing are _____.
5. Seaweed provides a gelatin called _____.
6. A moss or lichen (is, is not) also known as an angiosperm.
7. The best summary for the chart is:

_____a. Plants are used as ingredients in foods and drugs.
_____b. Simple and complex plants are used in foods and drugs.
_____c. Plants are of great importance to people and animals.
_____d. Angiosperm plants are of great importance to people and animals.

OBJECTIVE: To develop vocabulary related to zoology

The following passage discusses how animal life forms developed through the ages. Read to find out:

1. how nature makes a fossil
2. what is meant by "survival of the fittest"
3. the order in which animals appeared

The underlined words are important vocabulary related to the history of animals on earth.

THE HISTORY OF ANIMALS

Most scientists agree that life began on earth about four billion years ago. Their theory of how our present life form came about is called **evolution**. They say that plants and animals developed as they did in response to their surroundings. We can trace how one life form developed from another by looking at fossils. Long ago an animal may have fallen dead into the mud. The shape of the dead animal made an imprint. Layers of mud formed on top of one another. The mud eventually became rock. The hardened imprint--or sometimes, skeleton--of the animal in the rock is called a **fossil**. When scientists find fossils, they find a record of the past.

Looking at fossils has shown us that life began in the water. At first there were only single-celled life forms. Multicellular life seems to have arisen 600 million years ago. This began the Paleozoic Era. During this era, around 350 million years ago, animals spread to the land. Each time life forms changed, they seemed to adapt to the environment. As animals spread throughout the world in search of food and safety from other life forms, their conditions changed. The animals which could best change with their surroundings, get food, and stay safe, survived. This is called **natural selection**. It is also called "survival of the fittest." Life forms which did not adapt became **extinct** over the years. They were no longer alive on earth. We only know about them through fossils.

Natural selection can occur because of internal changes in animals. For example, a pair of giraffes has three offspring. One has a longer neck than the others. This giraffe can reach into the trees for food. It can get more food, so it becomes bigger and stronger. Fewer and fewer giraffes can compete with it. Its offspring have long necks as well. These long-necked giraffes continue to thrive. The short-necked ones gradually die out or move to a place where they can get food with less competition. Soon the new species of giraffe comes to be the most

dominant. It may have been that the first long-necked giraffe came about because of heredity. But giraffes could also have developed through adaptation to their environment and food source. Therefore, both heredity and geographical location influence natural selection.

Since the first appearance of multicellular animals 600 million years ago, there have been three long time periods of life formation. These eras each began and ended during a time of drastic changes in the earth's climate and physical formation. The species that could adapt survived from era to era. Some, like sponges and water snails, hardly changed at all.

The order in which animals appeared has been divided into three major eras, or time periods. You will read about most of these animals groups in this course.

The Paleozoic Era

This era began 600 million years ago and lasted until 230 million years ago. It is known as "The Age of Ancient Life." During this time, multicellular animals in the water developed into many of the sea creatures we know today. Some water animals moved to land. **Crustaceans** evolved during this era. These are animals like lobsters and crabs. They have hard shells but no backbones. During this time, the first insects and amphibians also evolved. Amphibians, like frogs and toads, are partly adapted to land and partly adapted to water.

By the end of this era, amphibians had become the dominant animals on land and the reptiles were beginning to appear. **Reptiles** are air-breathing animals like snakes and turtles. They have backbones and scaly skin.

After the Paleozoic Era, the earth was in upheaval. For millions of years, mountains were formed and glaciers extended from the poles toward the equator. Some waters of the earth dried up and more land emerged. This led to a new era.

The Mesozoic Era

This era is known as "The Age of Reptiles." It lasted from around 230 million years ago to 70 million years ago. Reptiles covered the land. Some of these were dinosaurs. The first birds appeared as well.

Another land formation upheaval occurred between this era and the Cenozoic Era. At this time, dinosaurs disappeared from the face of the earth, and a new era began.

The Cenozoic Era

Cenozoic means "recent time." However, this era is commonly known as "The Age of Mammals." Early in this era birds and mammals came to dominate the land. Mammals are air-breathing animals like horses, cats, apes, and people. They have backbones, hairy bodies, and can produce milk for their young. Man and modern human cultures came about during the latter part of this era. This time period encompasses 70 milion years ago to the present.

A. DIRECTIONS: Complete each sentence with one of the following words.

amphibians	**crustaceans**	**fossil**	**Mesozoic Era**	**Paleozoic Era**
Cenozoic Era	**extinct**	**mammals**	**natural selection**	**reptiles**

1. Animals which produce milk for their young are called _____.
2. The _____ encompasses modern time as well as 70 million years ago.
3. Animals species become _____ when they cannot survive.
4. Lobsters and crabs are examples of _____.
5. The _____ began 600 million years ago.
6. A _____ is the imprint of the remains of a dead animal.
7. Toads and frogs are examples of _____.
8. _____ have scaly skin and breathe air.
9. The era before the Cenozoic Era is called _____.
10. _____ is affected by both heredity and changes in the environment.

B. DIRECTIONS: Write **true** or **false** before each statement below.

_____ 1. Amphibians produce milk to feed their young.

_____ 2. Cenozoic means "long ago."

_____ 3. Crustaceans evolved during the Paleozoic Era.

_____ 4. Life forms which could not adapt from era to era became extinct.

_____ 5. Fossils provide us with a record of animal development.

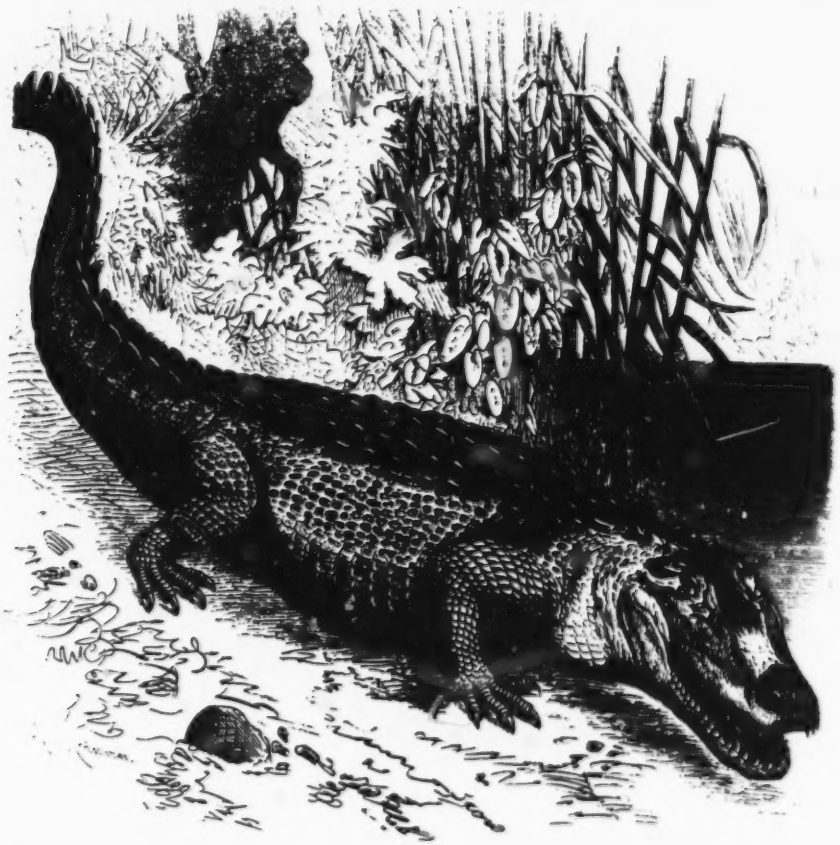
_____ 6. The Cenozoic Era is known as "The Age of Mammals."

_____ 7. "The Age of Reptiles" was the Paleozoic Era.

_____ 8. Reptiles have hairy bodies.

_____ 9. Animals without backbones are called mammals.

_____10. Natural selection is also called "survival of the fittest."

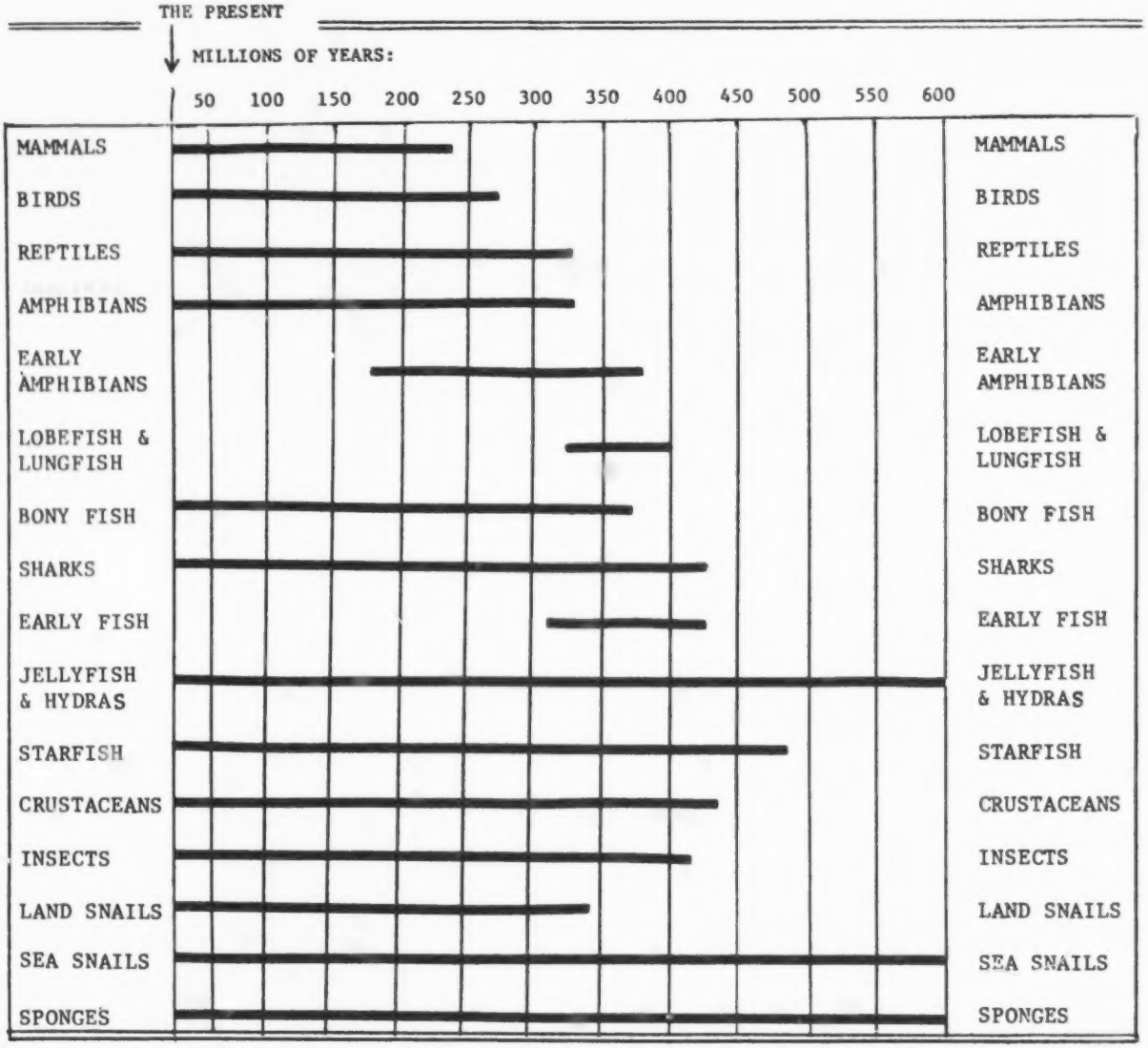


When you look at the chart below, you will notice:

1. The earliest life form to appear on earth is listed at the bottom. The most recent is listed at the top. The chart is to be read from the bottom upward.
2. The present time is at the left, extending back in time as you read to the right.
3. The horizontal lines indicate the amount of time each animal group has been (or was) on earth.

C. **DIRECTIONS:** Refer to the chart to answer the questions that follow it.

TIME LINE SHOWING THE EXISTENCE OF SOME ANIMAL GROUPS



1. The number 600 indicates _____ of years ago.

   a. hundreds b. thousands c. millions

2. The life group that was in existence the shortest time is _____.

   a. early fish b. lobefish and lungfish c. early amphibians

3. Insects appeared more than _____ millions of years ago.

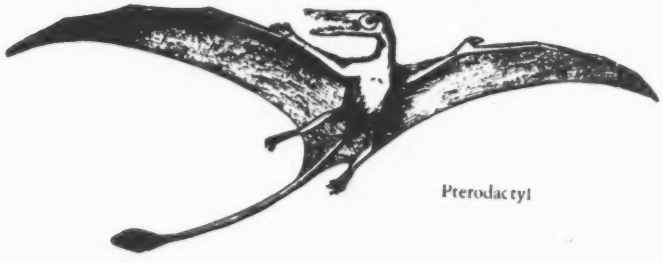
   a. 400 b. 450 c. 500

4. According to fossil records, lobefish and lungfish appeared _____ bony fish.

   a. before b. after c. at the same time as

5. Hydras and jellyfish existed _____ sponges.

   a. before b. after c. at the same time as



Pterodactyl

OBJECTIVE: To develop vocabulary related to zoology

We have learned that animal life began in the water and spread to the land. The remaining reading selections in this course have been divided between land animals and water creatures. There are **vertebrates** (animals with backbones) and **invertebrates** (animals that do not have backbones). Invertebrates are more complex than single-celled animals. They are not as complex, however, as the vertebrates. There are thousands of land invertebrates. We will discuss only three very general types. These are insects, worms, and spiders. They are most often found on land. Although insects are not the simplest or lowest form of invertebrate, they are the most plentiful and will be discussed first.

In this exercise, read to find out:

1. how many legs insects have
2. how insects cause people's lives to be better or worse
3. what is meant by "social insects"

The underlined words are important vocabulary related to insects.

INSECTS

Insects have many special **characteristics**. For instance, all insects have six legs. Many have one or two pairs of wings. Many, such as beetles, have hard outer skeletons made of a substance called **chitin**. Insects have three body parts: a head, thorax (chest), and abdomen. They do not have lungs but breathe oxygen through pores in their body walls. Most insects see through **compound eyes**. These are large numbers of small eye units packed closely together into a large eye.

Insects have **adapted** to every kind of environment or **habitat**. They have changed and adjusted until today, they are the largest group of animals. In fact, the group is larger than all other groups combined. Insects are a major food source for many animals. Some, such as silkworms, spin silk. Many plants could not thrive without insects to pollinate them.

There are many different orders or groups of insects. Four of the most common orders are grasshoppers, butterflies and moths, flies and mosquitoes, and ants and bees. The grasshopper order includes crickets, cockroaches, katydids, and so forth. Crickets chirp at night and are really very destructive little insects. They eat farmers' crops. In fact, most insects in this order are pests. Butterflies and moths are pretty, large-winged insects. They have long tubes through which they suck **nectar**, or sweet liquid, from flowers. Their young, caterpillars, are harmful to plants. Some moths are also harmful to woolen cloth.

Ants, bees, and wasps are known as social insects. All of them form societies in hives, hills, or nests. Honeybees have female workers and male bees called **drones**. The drones feed and keep clean the one, immense queen bee which lays all the eggs. Ants have the most complex organization. They have various kinds of workers that do different jobs.

Flies and mosquitoes have sucking mouth parts. Mosquitoes feed on blood. They carry diseases such as **malaria** and **yellow fever**. Houseflies do not bite but live on liquids around our homes. They also live in garbage and animal manure. Flies are full of dirt and bacteria which they leave on our food. The young in this order are larvae, which are legless, wormlike **maggots**. As they mature, they go through **metamorphosis**, a complete change of appearance.

Flies and mosquitoes, along with ants and bees, are considered by many people to be the worst pests. Actually, in some ways, bees and ants are good to have around. For instance, bees are the best pollinators of plants and flowers, and ants act as "clean up crews."

A. DIRECTIONS: The following words are from the opening paragraph and from the selection on insects on the previous pages. See if you can find the words. Then write a definition for each word.

1. habitat _____

_____

2. invertebrate _____

_____

3. characteristics _____

_____

4. vertebrate _____

_____

5. adapted _____

_____

B. DIRECTIONS: Fill in each blank with one of the words listed below.

chitin	**compound eyes**	**drones**	**metamorphosis**
environment	**nectar**	**maggots**	

1. _____ is a sweet liquid that comes from flowers.

2. Insects have hard skeletons made of _____ and large numbers of small eyes packed close together to form _____.

3. Another word for habitat or surroundings is _____.

4. _____ are the young of flies and mosquitoes.

5. _____ are male honeybees.

6. When insects undergo _____, they have a complete change of appearance.

OBJECTIVE: To prepare a simple outline

DIRECTIONS: Study the information below about outlining. There are several reading selections that follow it. Read each selection and complete the exercises.

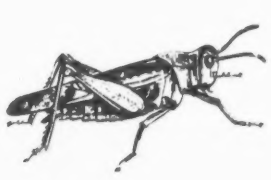
THE IMPORTANCE OF OUTLINING

Making an outline helps to organize information. This information can be ideas or facts you may want to remember. You may want to organize the information as a study aid. If you know you are going to outline a reading selection, you may want to think about your outline as you read.

When you outline, group related ideas together. Arrange the groups in sensible order. The main ideas are the **main topics**. **Subtopics** will support main topics. **Details** will support the subtopics.

Rules for Outlining

1. Put a title above the outline.
2. Use Roman numerals (I, II, etc.) for main topics.
3. Use capital letters (A, B, etc.) for subtopics.
4. Use Arabic numerals (1, 2, etc.) for details.
5. Put periods after the numerals and letters.
6. Indent subtopics under the main topic.
7. Indent details under subtopics.
8. Begin the first word in the main topics, subtopics, and details with a capital letter.
9. The outline form should remain the same throughout. Do not mix a sentence outline with a topic outline. In a topic outline, each item consists of a key word or words. In a sentence outline, each item contains whole sentences.



BRIEF FORM OF TOPIC OUTLINE

Title

I. Main Topic
   A. Subtopic
   B. Subtopic

II. Main Topic
   A. Subtopic
   B. Subtopic

EXPANDED FORM OF TOPIC OUTLINE

Title

I. Main Topic
   A. Subtopic
      1. Detail
      2. Detail
   B. Subtopic
      1. Detail
      2. Detail

II. Main Topic
   A. Subtopic
      1. Detail
      2. Detail

A. DIRECTIONS: Read the outline, then look at the topics and subtopics at the left. Write them where they fit in the outline.

A Nature Safari to Kenya

Mt. Kenya peaks
Activities
Living outdoors
Bedding
Hiking
Maps

I. Places to see
   A. Serengeti Plains
   B. _____
   C. Great Rift Valley

II. Planning what to pack
   A. Clothing
   B. Meals
   C. _____
   D. Camera supplies
   E. _____

III. _____
   A. Tenting
   B. _____
   C. Cooking
   D. Photographing

IV. Unusual Benefits
   A. _____
   B. Being completely self-sufficient
   C. Seeing plants and animals in their natural habitat
   D. Hearing sounds of the wild

B. DIRECTIONS: Read the passage about worms in "Animals Without Legs." The paragraphs have been numbered so that you can refer to them easily. As you read, notice the main ideas (main topics) and subtopics that support them. You will also see that the paragraphs give several details about each subtopic.

ANIMALS WITHOUT LEGS

1. Worms can be grouped into flatworms, roundworms, and segmented worms. There are many **flatworms** which are parasites. Some can cause diseases in humans. Every flatworm has both male and female organs. As the name suggests, flatworms have flattened bodies. Flukes and tapeworms are both flatworms.

2. Flukes are found most often in Africa and Asia. They find hosts in places such as the liver and the blood of humans and other fish-eating mammals. Thorough cooking of fish keeps these worms from being passed on to humans.

3. Adult tapeworms live in the intestines of man and other animals. These parasites are nothing but eating and egg-laying machines. They have no eyes and their heads are made up of suction cups and hooks. These clamp onto the the wall of the intestines. A tapeworm grows by adding new flat body sections at the back of its head. Tapeworms can produce thousands of offspring. However, only a few of these will find hosts. The eggs of tapeworms will leave a host's body along with other waste. Whether people who live in a certain area get tapeworms depends on the waste disposal system there. There are animals which may have come into contact with waste used as fertilizer or dumped as garbage. Tapeworms are transferred to humans from many of these animals. Transference also occurs through raw or uncooked meat. Tapeworms can make people very sick. Doctors, however, can easily cure an illness caused by tapeworms.

4. **Roundworms** can be found almost anyplace. They have simple, round bodies. They come in all sizes and are only a bit more complex than flatworms. Many roundworms are parasites which can cause diseases in humans. Like tapeworms, they live inside the intestines. They also eject eggs into the human's waste system. The most common parasitic roundworms are ascarides, hookworms, and trichinae.

5. Ascarides are not too harmful unless they block the intestines or bore through them. Children who play in the dirt, then eat without washing their hands or put their hands in their mouth, could end up with ascarides. However, medical attention can rid them of these worms.

6. Hookworms are found in warm climates such as in our southern states. Cold weather in northern states most often kills in the ground. Hookworms suck blood from the intestines. Thousands can live there at any one time. These worms bore through the skin. They can be gotten from the slightest contact. Communities should have good, careful disposal of human waste to guard against them. Hookworms can make a host quite sick by weakening it little by little.

7. Trichinae can cause a more serious disease call trichinosis. Trichinosis can be fatal. Most cases of trichinosis come from eating undercooked pork. However, some cases develop because of contact with rats. Therefore, pork should be cooked thoroughly before it is eaten. Also, rat control measures should be taken.

8. The most common segmented worms are earthworms. Their bodies are divided into sections. Earthworms are more complex than flatworms or roundworms. They have mouths, throats, and intestines. They also have a minute brain and blood vessels. They contain quite a lot in their long, skinny bodies. Earthworms are very useful for growing plants. They stir the soil by digging down through it as they eat. Earthworms digest foreign matter from the soil, then deposit the purified soil as waste. They bring their deposits to the surface where good soil is needed. Earthworms make it possible for more water and air to get through the roots of plants.

The previous passage is about only one thing, worms. Thus, Worms is the title of the outline. ("Animals Without Legs" is meant to be a catchy title, one which draws the reader's attention.) Every outline has a title and more than one main topic. A very brief outline of the whole selection could be written in this way:

Worms

I. Flatworms
II. Roundworms
III. Segmented Worms

Notice that the first sentence of the passage introduces the whole article. It tells the reader what he is going to be reading about. Sometimes, but not always, you will find a summary sentence at the beginning and/or the end of an article.

Look at the rest of the first paragraph. What is the main topic? The paragraph gives general information about flatworms. It also says that flukes and tapeworms are flatworms. Notice that paragraph 2 is about flukes, and paragraph 3 is about tapeworms. You will notice that paragraph 4 tells about roundworms. As you can see in the outline above, "Roundworms" is a new main topic. Therefore, you will be working only with the first three paragraphs when you expand main topic I.

Worms

I. Flatworms

A. General Information
B. Flukes
C. Tapeworms

The next part, II, is about roundworms. The subtopics under roundworms are ascarides, hookworms, and trichinae. Part III is about segmented worms. Only one example of a segmented worm is given. Finish the brief form of the outline below.

Worms

(Outline B 1)

I. Flatworms

A. General Information
B. Flukes
C. Tapeworms

II. _____

A. _____

B. _____

C. _____

D. _____

III. _____

A. _____

Several details are written about each of the subtopics. These are to be listed under the proper subtopic, as shown below.

Worms

I. Flatworms

A. General Information
1. Many are parasites
2. Some cause disease
3. Each has male and female organs
4. They have flattened bodies

B. Flukes

1. From Africa and Asia
2. Live in fish
3. Found in fish-eaters
4. Killed by thorough cooking

Following the example shown above, write four details that are given about tapeworms. Keep them as brief as possible, using key words. Try not to write a complete sentence. If the information is given in a very brief sentence, as in the details for A., you don't have much choice. (There is such a thing as a sentence outline, where each entry is a complete sentence. Usually, you will not find sentences in topic outlines unless there is no other way to express the information. Topic outlines and sentence outlines are two different outline forms.)

(Outline B 2)

C. Tapeworms

1. _____

2. _____

3. _____

4. _____

Now, using the entire outline above as a model, see if you can finish outlining the reading selection about worms. You may want to refer to the brief outlines given first. You will have to make decisions about what is important and how to express it.

(One way to fill out the outline is to write the main topics, and then write the subtopics. Then fill in the details that support the subtopics.)

(Outline B 3)

II. Roundworms

A. _____

1. _____
2. _____
3. _____
4. _____
5. _____

B. _____

1. _____
2. _____
3. _____

C. _____

1. _____
2. _____
3. _____
4. _____

D. _____

1. _____
2. _____
3. _____

III. _____

A. _____

1. _____
2. _____
3. _____

(more)

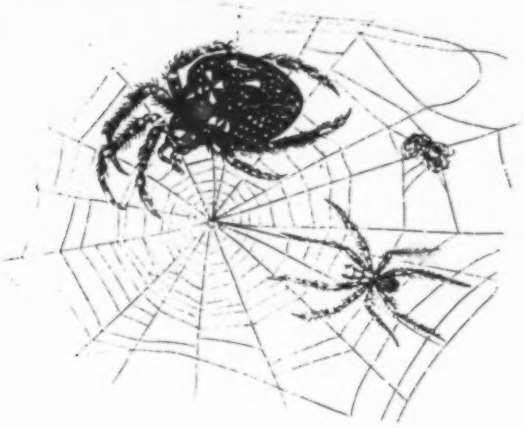
4. _____

5. _____

Notice this sentence in paragraph 8: "Earthworms are very useful for growing plants." All the details given after this sentence tell what earthworms do that makes them useful. Thus, they are actually sub-details. You are not expected at this time to list sub-details. (They would be called a, b, c, d, e, f.)

EIGHT-LEGGED ANIMALS

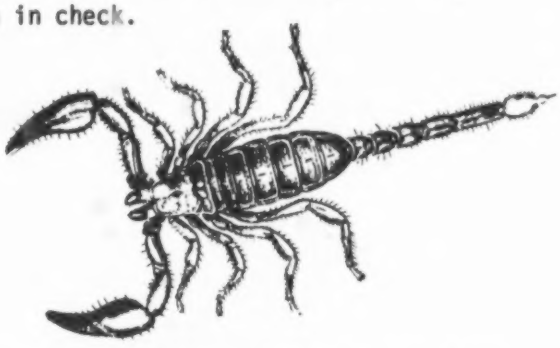
Arachnids



Spiders, as a class of animals, are referred to as **arachnids**. These are among the oldest land animals. They date back to over 400 million years ago. This group contains not only spiders but ticks and scorpions as well. All these animals are predators. They live on insects and other small animals by sucking fluids from their victims. All arachnids have eight legs and some form of poisonous glands. Very few of them, however, are harmful to man. Their bites will usually cause only swelling and itching. Black widow spiders, tarantulas, and some scorpions will cause pain, illness, and sometimes death.

Spiders can live almost anywhere. They make their webs of silk which comes from glands at the back of the abdomen. Some spiders are even blown by the wind to great heights on strands of silk. Spiders are important to man because they eat many insect pests and help to keep that population in check.

Scorpions live in warm climates. They hunt at night and hide during the day in shaded places away from the hot sun. Sometimes they are found in clothing, camping equipment, and beds. Scorpions look something like lobsters or crayfish with stingers on their tails.



Ticks are much smaller than either spiders or scorpions. They suck the blood of large animals and sometimes carry diseases such as spotted fever.

C. DIRECTIONS: Answer the following questions before you continue reading.

1. If **Arachnids** was a main topic in a brief general outline, what would be three subtopics to list under it?

   I. Arachnids

      A. _____

      B. _____

      C. _____

2. If you listed **Ticks** as a subtopic, what are three details to list under it?

   II. Arachnids

      A. Ticks

         1. _____

         2. _____

         3. _____

3. What is an example of a detail about scorpions?

   _____

4. What is an example of a detail about spiders?

   _____

5. The detail "eight legs" would be listed under . . .

   a) spiders b) scorpions c) ticks d) all of them

D. **DIRECTIONS:** Complete the following outline using information from "Animals Without Legs" and "Eight-legged Animals." Choose only three details for every subtopic. Notice that the expanded outline form is used here.

Land Invertebrates

I. Worms

A. Flatworms

1. _____
2. _____
3. _____

B. Roundworms

1. _____
2. _____
3. _____

C. Segmented worms

1. _____

II. Arachnids

A. _____

1. _____
2. _____
3. _____

B. _____

1. _____
2. _____
3. _____

C. _____

1. _____

2. _____

3. _____

OBJECTIVE: To prepare a simple outline

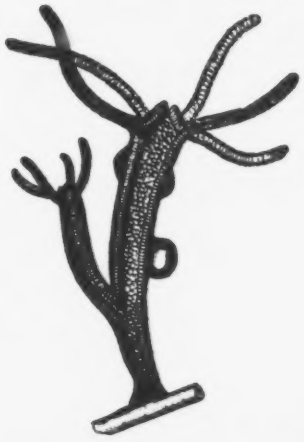
DIRECTIONS: As you read the following selection, pay close attention to what could be main topics, subtopics, and details. Also pay attention to underlined key words. Answer the questions placed between sections of the selection. Then complete the outlining exercise.

CREATURES OF THE SEA

Fish seem to dominate the sea. However, water is also the home of over 200,000 species of invertebrates. These sea creatures come in all shapes and sizes. Some look like plants but sting and eat little animals. Some latch onto the ocean floor and never move about. Others roam the seas. They are all unusual and as different from one another as night and day. Yet, they are all invertebrates and animals. Two of the most familiar groups of sea creatures are **crustaceans** and **mollusks**. Another group is **coelenterates**. These invertebrates will be discussed in the order of the simplest to the most complex.

Coelenterates

Hydras, jellyfish, sea anemones, and corals are coelenterates. Hydras have a tubelike body with a mouth at the top. Several tentacles which look like leaves surround their mouth. Hydras also attach themselves and stay in one place. Hydras move by somersaulting themselves. They eat smaller water animals after killing them with their stinging cells. Their tentacles have many of these cells which shoot little poison darts attached to threads into any animal that touches them. Like hydras, jellyfish also eat small sea animals. Unlike hydras, however, they drift along in the open sea. Jellyfish have an almost transparent body with a mouth on their underside. Tentacles surround their mouth and trail behind as they swim. Most jellyfish are only a few inches long. However, some grow up to six feet wide with tentacles over forty feet long. If a human being touches a jellyfish, its poisonous stinging cells will puncture his or her skin causing painful blisters. People can die from too many of these stings.



Sea anemones are beautiful creatures that look like flowers. As a matter of fact, a group of sea anemones is like a flowerbed that eats fish. The petals of these flowers are tentacles similar to those of hydras and just as deadly.

Corals are useful animals to man. They look something like hydras but are able to form limestone shells around their bodies. They hide within their shells for protection. They stretch out their tentacles to sting and catch their food. Corals tend to flock together connecting their caves to form reefs. As they reproduce, the reefs get larger and larger. Various creatures come to these reefs to live. Coral reefs are useful to man because the ones that rise out of the ocean can protect beaches and shorelines from erosion. Coral reefs can create safe harbors for ships. Sometimes, however, they can cause shipwrecks. Coral reefs are found mostly in warm ocean water. The largest coral reef in the world is near Australia and is over 1,000 miles long.

A. DIRECTIONS: Answer the following questions in preparation for outlining. Then continue reading.

1. From what you have read so far, what could be the title of your outline?

   _____

2. What would be one of your main topics?

   _____

3. What would be two possible subtopics for your main topic?

   _____

4. What would be an example of a detail?

   _____

5. If you wanted to set up the answers to questions 1-4 in outline form, which form would you use?

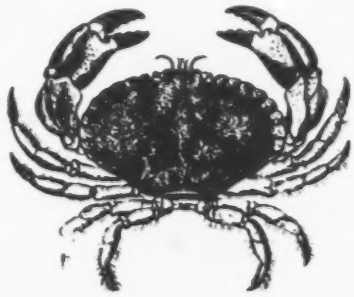
   _____

Mollusks

You are probably more familiar with mollusks as seafood than as invertebrates. These complex creatures include snails, clams, and oysters. Octopuses and squids are also found in this group. For the most part, they live in the water. A few, however, like snails, have moved to land. Clams and oysters are found in fresh water as well as in the ocean. Clams have double shells which open like a book. They have one muscular foot. They slide this foot down an opening in their shell and hobble along. They feed by filtering the water they pass through tubes. Clams have gills for drawing oxygen from the water. They also have an intestine, a heart, blood, and a waste removal system. The largest clams can grow to be six feet across and weigh several hundred pounds. Snails, like clams, have shells, gills, and hearts. Snails also have whirled shells and heads with antennae. Snails eat bacteria and algae and can be used to keep aquariums clean.

The squid is a type of octopus. The octopus lives on the bottom of the ocean but the squid swims along in the open sea. Whenever a squid or an octopus needs to move quickly, it shoots out a strong jet of water. That way it "jet-propels" itself. The squid has nerves and a brain. It also has several tentacles with suction-cup ends used to catch other animals for food. The squid is long, narrow, and built for speed. The octopus, however, is rounded and squat. It has eight arms or tentacles. Both the squid and the octopus can shoot out a cloud of ink to hide in. The common octopus is usually no more than four feet across from the tip of one tentacle to another. Some, however, in the Pacific Ocean can grow to be thirty feet across.

Crustaceans



Crustaceans are mostly known to us as "shellfish." These include lobsters, shrimp, and crabs. Some of the more important crustaceans are so small that many of them cannot be seen without a

microscope. These resemble tiny water insects and the oceans are teeming with them. They are important because they are the animals eaten by the coelenterates, mollusks, and other crustaceans. Even large fish and whales scoop them up by the thousands. Crustaceans are a major food source for other creatures as well as for man. The body of crustaceans like lobsters and crabs is divided into several sections, each with a pair of legs. The head and body are fused together. Legs near the head are used for holding and tearing food. Legs under the body are used for walking or swimming. Legs with pincers are used for catching other animals, digging, and fighting. Crustaceans lay eggs which are hatched in water. The shell of a crustacean does not enlarge. Therefore, when a young lobster or crab outgrows its shell, it will discard the shell and form a new one.

B. DIRECTIONS: Answer the following questions before you continue reading.

1. What are the two main topics from the part of the selection you just read?

   (1) _____ (2) _____

2. What are two subtopics for each main topic given in number (1)?

   _____ _____

   _____ _____

3. Give two details for each subtopic given in number (2).

   _____ _____

   _____ _____

   _____ _____

   _____ _____

C. **DIRECTIONS:** Complete the outline below using information from "Creatures of the Sea." Since this is only a practice outline, use only three details for each subtopic.

Invertebrates in the Sea

I. Coelenterates

A. Hydra (structure and characteristics)

1. _____
2. _____
3. _____

B. Jellyfish (structure and characteristics)

1. _____
2. _____
3. _____

C. Sea anemone (structure and characteristics)

1. _____
2. _____
3. _____

D. Coral (structure and characteristics)

1. _____
2. _____
3. _____

E. Coral Reef

1. _____
2. _____
3. _____

II. Mollusks

A. Clam (structure and characteristics)

1. _____

2. _____

3. _____

B. Snail (structure and characteristics)

1. _____

2. _____

3. _____

C. Squid (structure and characteristics)

1. _____

2. _____

3. _____

D. Octopus (structure and characteristics)

1. _____

2. _____

3. _____

III. Crustaceans

A. Microscopic crustaceans (structure and characteristics)

1. _____

2. _____

3. _____

B. Other crustaceans (structure and characteristics)

1. _____

2. _____

3. _____

OBJECTIVE: To prepare a simple outline

DIRECTIONS: As you read the following selection, pay close attention to what could be **main topics**, **subtopics**, and **details**. Then complete the outlining exercise.

THE FIRST VERTEBRATES

History of Fish

Water is the domain of thousands of species of invertebrates. However, fish, the first vertebrates, are still the most prominent animals away from the land. Early fish appeared around 425 million years ago. As land masses rose out of the oceans, the waters receded forming lakes and ponds. Some fish developed lungs. They also developed paddle-like fins to move onto the land. These lobe-finned fish and lungfish later evolved into amphibians and reptiles. Fish have also been important through history as a major food source for man and other animals. Fish are successful because of their ability to adapt. They can swim against water currents and go wherever necessary to get food and avoid enemies. Varying species of fish eat plant or animal foods or both. Fish are the most colorful, adaptable creatures of the sea.

Characteristics of Fish

Like all vertebrates, fish have highly complex bodies. Their bodies are organized into systems. There is a system for controlling movement, for breathing, reproducing, and digesting food. A separate system gets rid of waste. Fish also have muscles and skeletons like all other vertebrates and two pairs of moving parts as well. In man, these two pairs are our arms and legs. In fish, they are fins.

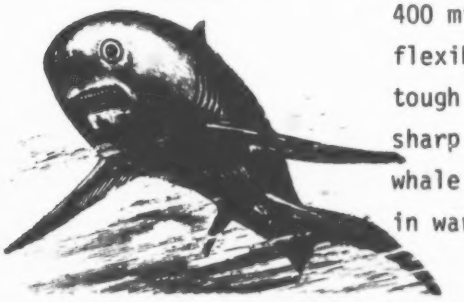
Part of what is special about fish is their variety. There are flat, thin fish that can move in and out of tight places. There are fish that hide on the bottom of the ocean that are as flat as manhole covers. Long, thin fish, like eels, can hide in holes and cracks. Streamlined fish, built for swimming, dart about in lakes, streams, and seas. The colors of fish can help to hide them. Those colors can also signal danger or the mating season.

Major Categories of Fish

There are three major categories of fish. They are lampreys, sharks, and bony fish. **Lampreys** are a form of a very ancient fish which first appeared over 400 million years ago. Lampreys are found in both fresh and salt water. They look some-

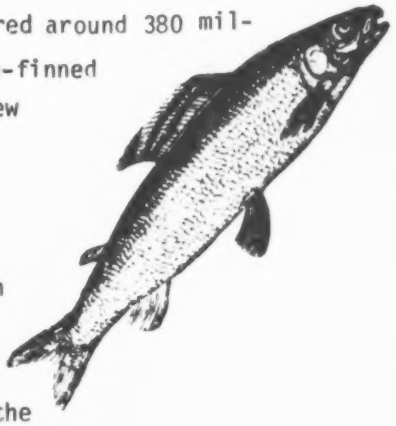
thing like eels in that they have long, slightly rounded, flexible skeletons. Lampreys do not have jaws. Their mouths are like suction cups with teeth that latch onto their victims. They attach themselves to other fish and hack a hole in the victim's body wall. Their tongues are coated with sharp spines to help them in this process. They may remain attached to their prey sucking out body fluids or burrow inside to devour internal organs. The lamprey class of fish contains the only vertebrates which are parasites.

<u>Sharks</u> are nearly as old a species as lampreys. They first appeared almost 400 million years ago. Their skeletons are made of soft, flexible bone called cartilage. Their skins are made of small, tough scales. Inside their jaws are several rows of flat, sharp teeth. Many sharks are relatively small. However, the whale shark can grow to forty feet or more. Sharks live mostly in warm water but have been known to wander north.



<u>Skates</u> and <u>rays</u> also belong to the shark family. These fish have flat bodies and hide on the bottom of the ocean. Their mouths are on the underside of their bodies. They have large triangular fins for swimming and long snakelike tails with poisonous stingers at the base. A human being who steps on these fish could receive a painful injury.

The **<u>bony fish</u>** category includes most of the fish we are familiar with. There are two groups of bony fish, the ray-finned and the fleshy-finned. The majority of the food and game fish are ray-finned. Examples of these are perch, trout, flounder, and cod. Ancestors of these bony fish first appeared around 380 million years ago. Fleshy-finned fish are the lungfish and lobe-finned fish. They appeared around 350 million years ago. Only a few species of the fleshy-finned fish are left. Most migrated to the land millions of years ago and followed a different path of evolution.



Bony fish have skeletons of bone and bodies covered with scales. They get oxygen from the water through their gills. They "breathe" oxygen and release carbon dioxide almost like land vertebrates. The gill, however, is its substitute for the lung that air-breathers have. These fish swim mainly with their tails.

Their fins are like pairs of arms to help with the swimming. Some bony fish have swim bladders that fill up with gas to help keep them afloat. That way they can drift in the sea without sinking.

DIRECTIONS: Refer to the selection to complete this outline. The first topic, subtopic, and important details have been provided for you. Find the other main topics, subtopics and details to complete the outline on your own. Use your own paper.

Fish

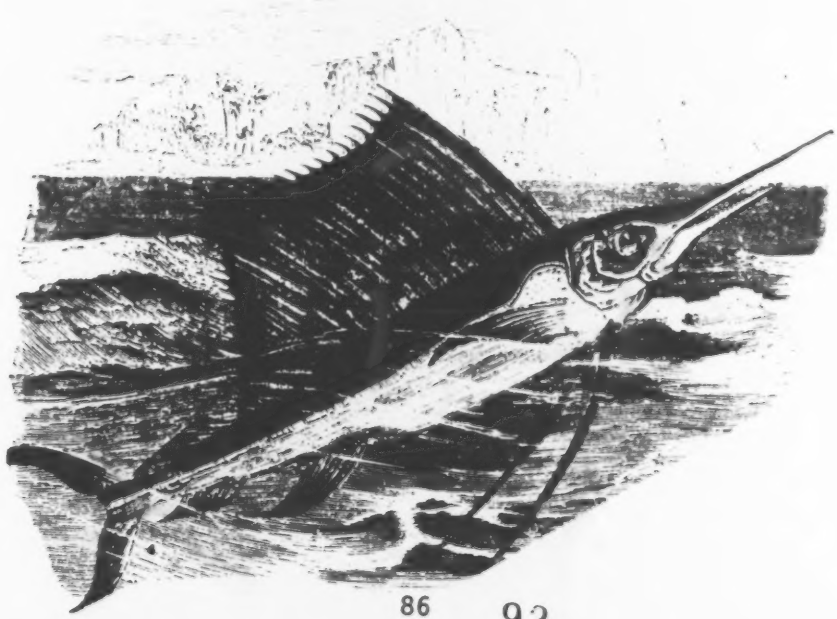
I. First Vertebrates

A. History

1. First appeared around 425 million years ago
2. Evolved into amphibians and reptiles
3. Important food source

B. Special Characteristics

1. _____
2. _____
3. _____



OBJECTIVE: To recognize generalizations

DIRECTIONS: Read the information below about generalizations. Then read the selections and complete the exercises.

PUTTING TWO AND TWO TOGETHER

At times, writers summarize facts that they have written about. They make a generalization, or draw a conclusion based on the facts. To make a good generalization, one must consider the facts with care. A sound generalization is called VALID. A generalization that does not reflect the facts or uses the facts to draw an inaccurate conclusion is called INVALID.

Below is a list of facts. Both valid and invalid generalizations follow.

The Evidence

1. Termites damage buildings.
2. Mosquitoes bite.
3. Flies carry dirt and diseases.
4. Moths eat cloth.
5. Silkworms spin silk.
6. Bees sting.

Invalid Generalizations

A. All insects are harmful.
B. Insects are never useful.
C. Insects are always pests.

Valid Generalizations

A. Many insects are harmful but some are not.
B. Insects are usually pests but some are not.
C. Some insects are useful to mankind.

The invalid generalizations are based on the characteristics of most insects, not all insects. Also, the feelings the reader may have about insects can color the conclusion they draw.

Look at the evidence. On one hand, it is a list of insect pests. On the other hand, useful insects are also listed. Now put two and two together. Not all insects are always pests, always useless, or always anything else. Words like some or many often describe facts better. Read generalizations with care. Match them to the facts you can find. Generalizations should not be too broad or sweeping. Valid ones best describe the facts whichever way they add up.

Words to be Careful of	Words That Are Helpful
always	most
never	some
every	many
all	sometimes
none	usually

When you read, you will usually find facts stated in paragraph form. Some of the facts may be grouped together into one general statement. The general statement is a short summary of the facts. Read the example.

EXAMPLE:

The people who run the Lincoln Park Zoo take great care to provide a natural setting for the animals. In the Great Ape House, gorillas, orangutans, and chimpanzees live in several habitats. This allows the apes to live in family units. Every habitat has ropes, climbing bars and high platforms. Twice a day, there is a tropical rainstorm in the Great Ape House complete with lightning and thunder. The heavy showers provide the humid environment that keeps the apes healthy.

Based on the facts given, note which of the statements below are valid generalizations.

VALID a. The people who run the zoo want to keep the animals healthy and happy. (This can be supported by the facts given.)

_____ b. Some apes enjoy swinging and others like to climb. (There is nothing in the paragraph to suggest that swinging and climbing are not enjoyed by all the apes.)

_____ c. There are several habitats in the Great Ape House. (This is not a generalization. It is one of the facts.)

VALID d. Gorillas, chimpanzees and orangutans are all Great Apes. (This is an assumption made from the facts that the zoo houses them all in the Great Ape House and provides the same kind of setting. Also, the last sentence of the paragraph supports this generalization.

VALID e. Apes come from the tropics. (Key words that lead to this generalization are "natural setting," "tropical rainstorm," and "humid environment.")

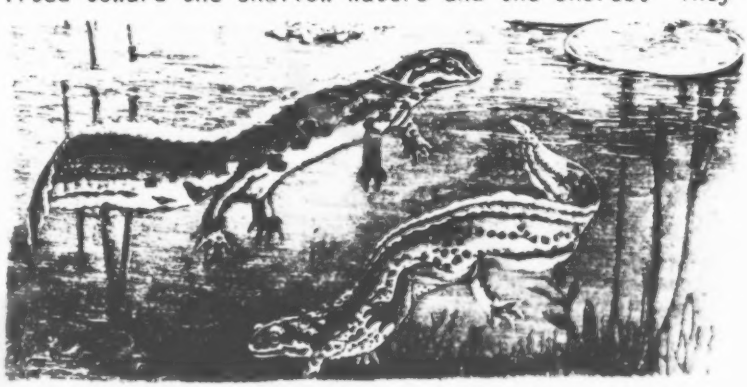
As you can see, several generalizations can be made from a few facts. You may be able to find even more in the example paragraph.

DIRECTIONS: Two generalizations have been made for each of the following paragraphs. Place a checkmark (✔) next to the valid one. Some of the sentences in the passages will not be related to the generalization. A single sentence may be the clue to the valid generalization. A good way to proceed is to first read the paragraph, then the generalizations. Then re-read the paragraph to check the validity of each generalization.

BETWEEN THE LAND AND SEA

EXAMPLE:

Between 350 and 400 million years ago, land was emerging from the vast seas. In some places, lakes, pools, and ponds were formed. Here, sea life was sometimes trapped. Some sea creatures drifted toward the shallow waters and the shores. They did this to find more food and to flee predators. Later, some pools and ponds dried up forcing animals to adjust to the land or die. Lobe-finned fish and lungfish were among the first to adjust. Some fish had thick, fleshy fins. They used these to move along on land. Lungfish could breathe air through primitive lungs. Animals which developed from these were the amphibians. No other vertebrates were on land at that time. Amphibians remained the dominant species on the land for millions of years.



Choose the valid generalization:

_____ a. Amphibians do not like the water.

__✔__ b. Amphibians became the dominant species on land because they had no competition from other animals.

1. Amphibians are the animals of shores, ponds, and swamps. They are cold-blooded animals. This means that their body temperature changes with the temperature of their surroundings. It also means that amphibians' bodies cannot create heat. Many that live in the north have to hibernate in the winter. Amphibians have to return to the water to breed. Adult amphibians have lungs and legs. Some species were among the first four-footed animals. Their young are usually water animals. Amphibians on land have moist skin which loses water easily. They also have no added scales, hair, or feathers.

Choose the valid generalization:

_____ a. Amphibians have not broken their ties to the water.

_____ b. Amphibians cannot live in cold climates.

2. Today, there are only three general groups of amphibians. These are salamanders, frogs, and toads. Salamanders are only a few inches long and are shaped like lizards. They have smooth, moist skin and no claws. Salamanders hide in damp places, and are harmless. Frogs are more highly developed than salamanders. They are the most common amphibians. Being cold-blooded, they hibernate in mud under water. Their young live in the water as tadpoles. Toads are similar to frogs, but their legs are much shorter. Toads' rough, warty skin can absorb water. Therefore, rain and dew can keep them moist. Because of this, toads have moved farther away from the water than other amphibians. They are tadpoles for a short time and spend much of their adult life on land. They hibernate in holes in the ground and can be found far away from water in places such as tree tops.

Choose the valid generalization:

_____ a. Toads are less dependent on water than any other amphibian.

_____ b. Most amphibians hibernate to be near the water.

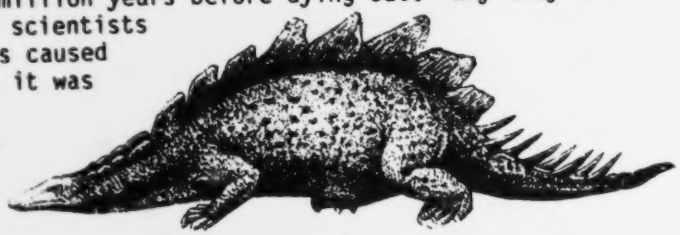
3. The amphibians that lived 350 million years ago were larger than the amphibians of today. This was because there was little competition for food and few predators. Having been on land for millions of years, amphibians formed new species because new climates and conditions called for adaptations. One group formed very useful characteristics for living on land. One trait was hard-shelled eggs with large yolks. Hard-shelled eggs could survive better than soft-shelled ones. The large yolks nourished the young better. This group also had dry skin covered with scales. These scales held in moisture so the animal did not have to keep returning to the water. A third useful trait was the ability to breathe through more highly-developed lungs. The group that developed all these traits became the first reptiles. These appeared 300 million years ago. Seventy-five million years later reptiles would dominate the land.

Choose the valid generalization:

_____ a. amphibians evolved into reptiles.

_____ b. Having skin which can hold in moisture is important for land animals.

4. During the Mesozoic Era, reptiles spread throughout the land. Some even returned to the water. Many species of reptiles evolved over several million years. The largest of these ruling reptiles were the giant dinosaurs. They were among the largest animals ever to have lived. Many weighed at least 50 tons. They ruled the land for about 100 million years before dying out. Why they died out is a scientific mystery. Some scientists think that extreme climatic changes caused their downfall. Others think that it was the rise of mammals, a more efficient group. A few scientists think that many species of dinosaurs over-adapted to conditions. When these conditions changed, the dinosaurs did not have the characteristics needed to survive the change. It was as if they had become over-specialized, and could not adjust to anything new. There were sixteen major orders of reptiles in this era. Now, there are only four orders. We know, however, that the great variety of reptiles from the Mesozoic Era gave rise to birds and mammals.



Choose the valid generalization:

_____ a. Extreme climatic changes and the rise of mammals caused the dinosaurs' downfall.

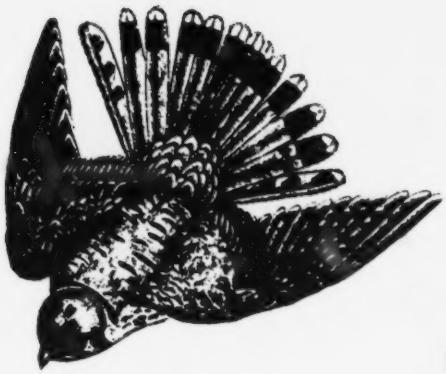
_____ b. Reptiles are a lower animal form than mammals.

5. The four orders of reptiles today are lizards, snakes, crocodiles, and turtles. Turtles were on earth at the time of the dinosaurs in much the same form as they are today. Crocodiles are the only group which directly descended from the dinosaurs. Like amphibians, reptiles are cold-blooded. They must also seek sunshine when they need heat. Some hibernate in cold weather. In hot climates, some are active only at night. Reptiles are found all over the world but mostly in warm areas. They are aided in their survival by either their hard shells, poison glands, or their ability to turn colors. Reptiles are valuable to man as food. They also supply leather and help control insects and rodents.

Choose the valid generalization:

_____ a. Modern reptiles are not related to ancient ones.

_____ b. Reptiles do not easily adapt to all climates and conditions.



OBJECTIVE: To recognize generalizations

DIRECTIONS: Read each paragraph and the generalization which follows it. Then determine whether the generalization is valid or invalid. Give evidence to support your answer.

BIRDS: WARM-BLOODED ANIMALS

Paragraph 1

Birds and mammals are warm-blooded animals. Unlike reptiles and amphibians, they are able to keep a constant body temperature. They are able to do this in spite of changes in the air temperature. Reptiles and amphibians have to seek sunshine or shade to keep their bodies from being too hot or too cold. This is why some cold-blooded animals must hibernate in winter or hide from the hot sun during the day. The activities of warm-blooded animals are not so restricted. This makes it easier for them to survive and adapt to many different conditions.

Generalization: Birds are better off than reptiles and amphibians because they are warm-blooded.

Is this generalization valid or invalid? Give evidence to support your answer.

Paragraph 2

Birds have other important characteristics besides being warm-blooded. They are vertebrates. They are also egg-layers and many species will tend their young. Birds are built for flying although some have lost their ability to fly. They have feathers, wings, and hollow bones. Flying enables birds to get food other animals cannot reach. Birds also use flying to escape enemies and radical changes in their surroundings. Most birds have fairly long life spans. It is estimated that there are 8,600 different species of birds world wide. As a result, there may be as many as 100 billion birds. They have been around for over 200 million years. This is a pretty good track record for such a "fragile" animal.

Generalization: Birds are not very successful animals because they have never ruled the earth or built cities or towns like man.

Is this generalization valid or invalid? Give evidence to support your answer.

Paragraph 3

Many scientists believe a certain theory about the development of birds. They think that some of the early reptiles went into the trees for food and safety. These reptiles were able to jump from branch to branch. As centuries went by, these reptiles developed membranes or thin skin between their forearms and bodies. These wing-like sections helped them steady themselves and glide from branch to branch. Soon reptiles had strong and wide enough membranes to glide from tree to tree. Scientists have found fossils dating back to 140 million years ago showing a creature with teeth, the tail of a lizard, and claws. It also had feathers and a gliding membrane. There are no fossil records for birds from the 20 million years after this creature appeared. The fossils dating after that gap showed birds capable of flight. These birds had strong wings, no teeth, feathers, and hollow bones.

Generalization: Scientists make assumptions based on fossil records.

Is this generalization valid or invalid? Give evidence to support your answer.

Paragraph 4

Flying enables birds to travel, or migrate, long distances. Scientists find bird migration an interesting puzzle. For instance, why do some birds fly south for the winter while others stay in the north? Birds probably do not fly south to avoid the northern cold because they are warm-blooded and have feathers. They could stand the cold. But birds eat different things. In the winter there are no insects around for the birds which feed on them. However, seeds are plentiful for the seed-eating birds. So, some birds probably migrate because their food will be gone. Birds migrate by instinct. The days which shorten as winter comes signal them to migrate south. In the spring, the longer days will tell them when to come back. Some birds migrate amazing distances. The Arctic tern flies 11,000 miles from the North Pole to southern Africa. The golden plover will fly nonstop from Canada to Brazil over 2,400 miles of water. How birds can do this is still a mystery.

Generalization: Birds fly south for the winter to avoid the cold.

Is this generalization valid or invalid? Give evidence to support your answer.

Paragraph 5

Birds are very useful to mankind. They provide food and are good pets. They have come to symbolize ideas such as peace and freedom. However, many bird species have become extinct through their contact with mankind. In North America alone three very plentiful species were wiped out. The great auk was killed off for food, oil, and fish bait by 1844. The Carolina parakeet was destroyed by 1901 because it raided farmer's fruit trees. In 1899 passenger pigeons disappeared. They were killed for food and sport. Some other American species in danger of being destroyed are the condor, the peregrine falcon, and the whooping crane. The great bald eagle, the symbol of the United States, is also in danger of extinction. Two causes of birds becoming extinct are uncontrolled hunting and misuse of insecticides. The chief cause, however, may very well be radical changes in the bird's environment. Cities, smog, highways, and farms replacing forests and grasslands have also hurt a number of other animals. Their domains are shrinking as man builds.

Generalization: Mankind may very well be the greatest enemy birds have.

Is this generalization valid or invalid? Give evidence to support your answer.

OBJECTIVE: To recognize generalizations

DIRECTIONS: Read the following selection then complete the exercises which follow.

WARM-BLOODED MAMMALS

Like birds, mammals are warm-blooded and are active in all temperatures. Cold-blooded animals, like the reptiles, do not keep warm when the weather is cold. They slow down and become inactive. The hair or fur on all mammals helps hold in heat the same way feathers help hold in body heat of birds. Together, birds and mammals have dominated the land for the last 75 million years.

Most mammals during the Mesozoic Era were small, mouse-sized animals. The first known mammals were tiny insect-eaters with long snouts, sharp teeth, and claws. They also had tiny brains and spent much of their time in trees. Gradually, many different species of mammals evolved from these little creatures. Early mammals changed in different ways from the reptiles. They developed jawbones while reptiles did not. Mammals also had legs which were directly under their bodies. Reptiles' legs extended from their sides and did not support their weight very well. Mammals could move much more rapidly. They also developed much better vision than reptiles. This was because early mammals spent more time in trees. They needed to be able to judge depth and distance in order to maintain their balance and move about.

Unlike reptiles and amphibians, mammals stay with their young. Females have mammary glands and are able to produce the food needed to feed their young. They also provide protection from predators. Because young mammals have at least one active parent, they have a model to learn from. Over millions of years, this modeling has caused a great increase in size of the part of the mammals' brain that deals with learning.

Over the ages, mammals of all kinds have moved into every habitat on earth. Horses, rabbits, and elephants, among others, live on the ground. Squirrels and monkeys, for instance, live in trees. Bats fly at night and moles dig underground. Seals and whales swim in the ocean while otters and beavers inhabit freshwater streams and lakes. There are meat-eating mammals and plant-eating mammals. There

are dangerous predators like lions and bears. There are also passive, timid animals like rabbits and mice. Some species even lay eggs.

Mammals are divided into two general groups. These are the marsupials and the placentals. Placentals are animals whose young develop fully in the womb. The fetus is nourished by a placenta which carries food from the mother's body. This is the way human babies develop. Most mammals are placentals. They are found all over the world. The young of a marsupial do not develop fully in the womb and are not attached by a placenta. Marsupial females have a pouch which surrounds their nipples. The young mature in the pouch until they are ready to be on their own. Kangaroos develop this way. Most marsupials are found in Australia. The only known one outside of Australia is the opossum of South America. Scientists think that millions of years ago Australia drifted away from the other continents. As a result, mammal development took a totally different path.

A.

DIRECTIONS: Look at the sentences below. Place a **G** before those that are generalizations and **F** before those that are facts.

_____ 1. Most mammals in Australia are different from mammals in the rest of the world.

_____ 2. Kangaroos' young mature in their mothers' pouches.

_____ 3. Seals and whales live in the ocean.

_____ 4. Any warm-blooded animal is better off than a cold-blooded animal.

_____ 5. All mammals are smarter than reptiles.

B.

DIRECTIONS: Read each of the following generalizations. Write a sentence stating whether you agree or disagree with it and explain why.

1. Mammals make the best mothers. _____

_____

_____

2. All mammals hunt other animals for food. _____

_____

_____

3. Mammals are probably the most intelligent animals. _____

_____

_____

4. Most mammals adjust well to different climates and conditions. _____

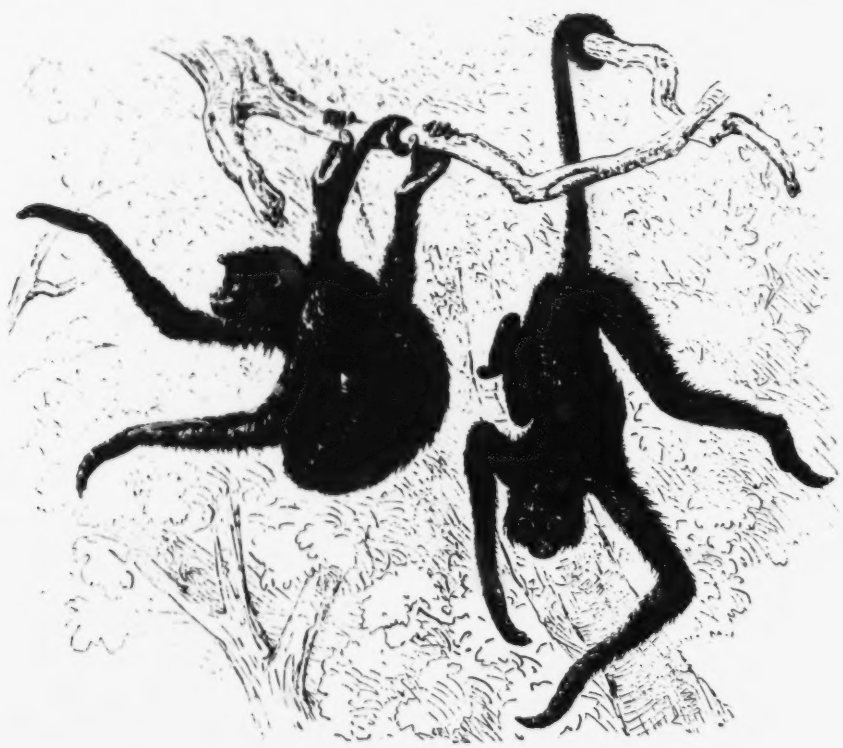
_____

_____

5. Marsupials are better mothers than placentals. _____

_____

_____



OBJECTIVE: To review skills introduced in 701-703

VOCABULARY

DIRECTIONS: Match each word with its definition on the right.

_____ 1. precipitation

_____ 2. photosynthesis

_____ 3. vascular

_____ 4. vapor

_____ 5. pollination

a. having to do with veins

b. water that falls to earth as rain, snow, and hail

c. in plants, the process by which male sex cells are transported to female sex cells

d. process by which plants use light and chlorophyll to make sugar, starch, and oxygen from carbon dioxide and water

e. water particles in the air

DIRECTIONS: Circle the letter of the word that completes each sentence.

6. The _____ is the specialized portion of a cell that directs a cell's activity.

   a. chromosomes b. cell wall c. nucleus d. hydrosphere

7. The smallest of the one-celled organisms is called _____.

   a. mildew b. bacteria c. propagation d. phylum

8. When a seed sprouts, it is undergoing _____.

   a. photosynthesis b. germination
   c. reproduction d. vegetative propagation

9. In a cell, _____ are the threadlike bodies that carry genes.

   a. chlorophyll b. rhizoids c. parasites d. chromosomes

10. The forms of animal life that have no backbone are called _____.

    a. invertebrates b. stomates c. fossils d. mitochondria

11. A _____ is a substance that causes air or water to be impure.

    a. memorane b. protista c. pollutant d. genus

12. The entire mass of water on the earth's surface is called the _____.

    a. hydrosphere b. atmosphere c. mantle d. spectrum

13. The predictable patterns of air that flow around the earth are known as _____.

    a. air pressure b. air currents c. barometers d. pollutants

14. _____ is the green coloring matter in plants.

    a. chromosome b. crustacean c. cotyledon d. chlorophyll

15. The distance light can travel in one year is a light _____.

    a. spectrum b. prism c. year d. galaxy

CAUSE AND EFFECT

DIRECTIONS: Match each cause on the left with the best effect on the right.

	CAUSES	EFFECTS
_____ 16.	When two parts of hydrogen and one part of oxygen are combined,	a. the air we breathe is polluted.
_____ 17.	Because of harmful chemicals and other foreign materials,	b. radar screens pick up their images.
_____ 18.	Due to very high temperatures,	c. many crops in the United States were destroyed.
_____ 19.	As a result of water pollution last summer,	d. the Chicago beaches were closed for two days.
_____ 20.	When water droplets and ice-crystals reflect radio waves,	e. water is produced.

DIRECTIONS: Underline the cause once and the effect twice in each sentence below.

21. When an egg and a sperm unite, fertilization has taken place.

22. I lost weight because I went on a low-calorie diet.

23. The restaurant was forced to close because of the boycott.

24. Since you have completed all of your science projects, you do not have to come to class tomorrow.

25. Most of the area surrounding Lake Ferguson was evacuated because of flooding.

CHARTS AND DIAGRAMS

DIRECTIONS: Study the following diagrams which show wind direction. Then answer the questions which follow. The arrows indicate the direction the wind is blowing.

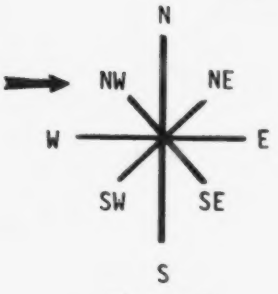


Figure 1

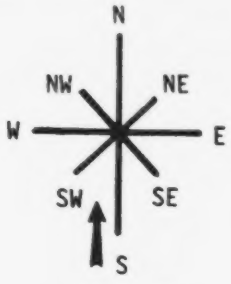


Figure 2

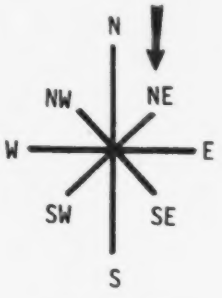


Figure 3

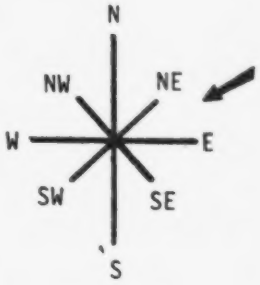


Figure 4

26. The wind in Figure 1 is coming from the _____.

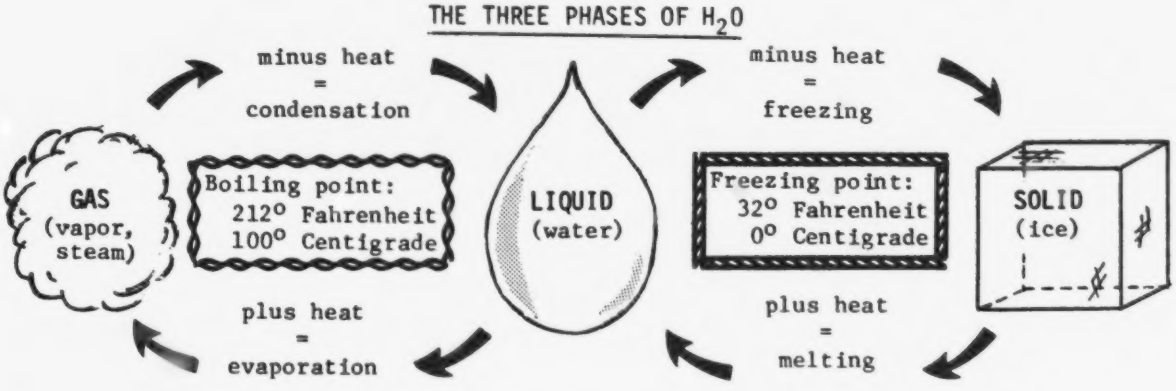
27. The wind in Figure 2 is moving toward the _____.

28. The north wind in Figure 3 is heading toward the _____.

29. The wind in Figure 4 is coming from the _____

30. and moving toward the _____.

DIRECTIONS: The diagram below tells you a number of facts. Study it carefully. Use it to get and check the correct answer.


THE THREE PHASES OF H_2O
minus heat = condensation
minus heat = freezing
GAS (vapor, steam)
Boiling point: 212° Fahrenheit 100° Centigrade
LIQUID (water)
Freezing point: 32° Fahrenheit 0° Centigrade
SOLID (ice)
plus heat = evaporation
plus heat = melting

31. Gas _____ as it becomes water.

a. condenses b. evaporates c. freezes d. melts

32. _____ is the factor that determines the form that water takes.

a. boiling point b. freezing point c. temperature d. evaporation

33. The bubbles of gas that are formed in water as it boils are caused by _____.

a. evaporation b. condensation c. melting d. freezing

Questions 34 and 35 each have two answers.

34. Vapor can be found in the form of:

_____ a. ice
_____ b. liquid
_____ c. steam
_____ d. gas

35. The temperature at which ice melts and water freezes is at or close to:

_____ a. 100^{o} C.
_____ b. 32^{o} F.
_____ c. 0^{o} C.
_____ d. 212^{o} F.

COMPARISON AND CONTRAST

DIRECTIONS: Study the labels below, then answer the questions that follow them.

LABEL A

75 ¢

GENERIC
ORANGE JUICE DRINK
CONTAINS 10% ORANGE JUICE
WATER, SUGAR, AND CORN SWEENENERS

64 FLUID OUNCES

LABEL B

SALE PRICE
$1.00

100%
ORANGE JUICE
NO SUGAR OR PRESERVATIVES ADDED

64 FLUID OUNCES

36. What are the similarities?

_____

_____

37. Which one costs more? _____

38. Which one has added ingredients? _____

39. Which one is pure? _____

40. Which one contains no added sugar? _____

41. Which one is a better buy? _____

DIRECTIONS: Read the paragraph below. Then list similarities and differences between plants and animals.

There are certain characteristics that plants and animals have in common. Both use food for nourishment and growth. Both eliminate waste material and respond to stimuli such as heat, cold, light, and darkness. Plants as well as animals are made of cells and produce offspring. Plants, however, lack a nervous system and sense organs. They are unable to move about by themselves. Most plants must have light to live. Only plants are able to manufacture their own food.

COMPARISON AND CONTRAST

SIMILARITIES

42. _____

43. _____

44. _____

45. _____

46. _____

DIFFERENCES

47. _____

48. _____

49. _____

50. _____

51. _____

GENERALIZATIONS

DIRECTIONS: Select the best word to complete each generalization below. Choose from the words few, most, all, and no.

52. _____ cherries are fruit.

53. _____ United States Presidents have been men.

54. _____ Americans have not eaten ice cream.

55. _____ minors can legally purchase alcoholic beverages.

56. _____ athletes are inducted into the Sports Hall of Fame.

DIRECTIONS: Read each of the following paragraphs. Determine whether each generalization is valid or invalid.

57. Continental drift is a theory that says the earth's crust is made up of ten large plates and many smaller ones. These plates make up the ocean floors and carry the continents. Between the plates are ridges. Magma flows up from the ridges. As the magma cools, it condenses or gets smaller. The plates then move away from the ridges. Eventually, one plate crushes into another. One of these plates will be pushed down underneath the other in a place called a trench. Here, the plate is melted and once again becomes magma.

Generalization: The plates that make up the earth's crust are constantly renewing themselves.

Is the generalization valid or invalid? Give evidence to support your answer.

_____

_____

58. Between Mars and Jupiter is a belt of asteroids. Asteroids are rocks floating in space. Some asteroids are as large as islands and many miles across. Others are as small as dust. Some scientists think that these rocks may be the remains of a small planet that once orbited between Mars and Jupiter. They think that a small planet may have exploded or that it collided with something like a comet. Other scientists think that the asteroids are parts of a moon that escaped Jupiter's gravitational pull. Still other scientists think that when the solar system was forming, this ring of rocks did not contain the necessary properties for forming a planet.

Generalization: Scientists have all the explanations for understanding our solar system.

Is the generalization valid or invalid? Give evidence to support your answer.

_____

_____

OUTLINING

DIRECTIONS: After giving the outline a title, write in missing numerals and letters.

(title) _____ 59

I. Mt. Etna erupts

_____ 60 Spectacular show

_____ 61 Lightning bolts

_____ 62 Deep cracking booms

_____ 63 Smell of sulphur

_____ 64 Village threatened

_____ 65 In path of lava

_____ 66 Vineyards and olive groves destroyed

_____ 67 Lava hardens 100 yards from homes

_____ 68 Volcano-watch

_____ 69 Week-long major eruptions end

_____ 70 Minor tremors recorded by instruments

_____ 71 People arrive

_____ 72 Italian and foreign tourists

_____ 73 Scientists from around the world

74. **DIRECTIONS:** Outline the following selection. Give your outline a title. Use your main topics: The **Scientific Method** and **The Scientist.** List subtopics under the main topics. You should also list details under each subtopic. Use a separate sheet of paper for your outline.

Scientists use "the scientific method" to understand how something works. It helps them to see how or why something changes. The scientific method includes making a hypothesis, experimenting, forming a theory and, when possible, stating a law. A **hypothesis** is a possible answer to a question. It is based on previous experience and reading. It may also be based on talks with others who are interested in the same subject. After a scientist makes a hypothesis, he sets up an **experiment** to find out whether it is accurate. He must figure out what kinds of tools he will need for the experiment. Also, he must decide just what it is that he needs to look for. He might test several hypotheses. It has been said that "by trying many solutions, scientists often find the right one."

After experimenting, the scientist may be able to form a **theory** about why or how something happens. The theory will be based on the outcomes he has observed. Thus, a theory has more facts to back it up than a hypothesis has. A scientist may experiment even further to learn more about a theory. When a theory has very few exceptions it can be called a **law.** However, as time goes by and more is learned, some old laws prove to be wrong. When this happens, scientists go back to the hypothesis stage. They start the cycle of hypothesis, experiment, theory and law all over again.

A scientist must always be neutral and impartial, strictly an observer. If he makes up his mind about why something is so before he knows the outcome of his experiments, he is not using "the scientific method."

OBJECTIVE: To develop vocabulary related to biology (human body systems and structures)

The following passage is an introduction to the anatomy and physiology of the human body. Read to find out:

1. the relationship among cells, tissues, membranes, and organs
2. what is meant by a "system" of the body
3. where some major organs fit into the main cavities of the body

The underlined words are important vocabulary related to human body systems.

HUMAN BODY SYSTEMS

The human body contains many structures. The study of where these structures are placed is called **anatomy**. **Physiology** tells us how each part works and how different parts work together. Many organs working together to perform a main function is called a **system.**

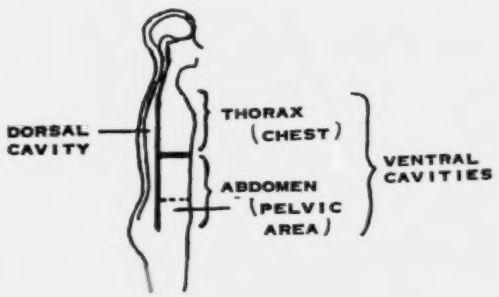
Almost all living things large enough to be seen without a microscope are made up of thousands, even millions of cells. Masses of similar cells form **tissue**. In the human body, tissues have specific jobs. For instance, skin tissue protects the body from infection. Muscle tissue moves a certain bone or other part of the body by tightening or loosening. Connective tissue supports or binds body parts or internal organs. A **membrane** is a thin layer of tissue that protects and sometimes holds a part of the body in place. The brain, for instance, is covered by a membrane that separates it from the bony skull.

Tissues are organized to form organs. Each **organ** performs certain functions. For example, lungs take in air, pass oxygen into the body, and expel waste gases. The stomach contains structures and chemicals to help digest food. One function of the liver is to purify blood by freeing it from waste matter.

A group of organs that perform a particular vital function (such as digestion) is called a **system**. There are at least nine commonly recognized systems of the human body. (See the chart that follows.)

SYSTEM	FUNCTION	MAJOR ORGANS IN THE SYSTEM
Circulatory	Uses blood to carry food and oxygen to the body's cells and waste away from cells.	Heart, veins, arteries, and capillaries
Digestive	Changes food to a state where it can be absorbed by the body and used by the cells as fuel.	Mouth, salivary glands, teeth, esophagus, stomach, intestines, liver, gallbladder, and pancreas

Endocrine	Makes hormones which regulate the activity of the organs in the body.	Glands (pituitary, thyroid, adrenal, etc.)
Excretory	Removes waste from the body.	Skin, lungs, kidneys, and bladder
Muscular	Aids the body in movement.	Tendons and ligaments
Nervous	Controls and coordinates body activity and sensation. Transmits messages between parts of the body and the brain.	Brain, spinal cord, and nerves
Reproductive	Creates offspring.	**Male** (testicles, penis, etc.) **Female** (ovaries, uterus, fallopian tubes, vagina, etc.)
Respiratory	Supplies the body with oxygen. Allows air to be taken into and let out of the lungs.	Nose, windpipe, and lungs
Skeletal	Protects body parts, stores minerals, makes blood cells, and gives shape to the body.	Bones and cartilage



Anatomists have found that the human body has two main cavities. You may think of a cavity as an empty space, but these two are filled with organs. The **dorsal**, or back, cavity contains the spinal cord and the brain. The **ventral**, or front, cavity is partly enclosed by the spine and ribs. It is divided into two parts. They are the chest and abdomen. The **thorax**, or chest, contains the heart and lungs. The **abdomen** holds the stomach, intestines, liver, and other organs. The lower part of the abdomen is the **pelvic area**. The **pelvis** is a bony construction shaped like a bowl. It contains the organs of reproduction, the bladder, and the tubes through which waste matter passes. Each area is lined by a smooth membrane. It is folded around the organs so that they are supported as if in a hammock.

A. DIRECTIONS: Circle **TRUE** after each statement that is correct. Circle **FALSE** if a statement is incorrect.

1.	The ventral cavity contains the spinal cord.	**TRUE**	**FALSE**
2.	The respiratory system deals with the flow of blood through the body.	**TRUE**	**FALSE**
3.	Anatomy is the study of the basic structure of man and animals.	**TRUE**	**FALSE**
4.	The circulatory system carries messages to the brain.	**TRUE**	**FALSE**
5.	Tissues are large areas of similar cells.	**TRUE**	**FALSE**
6.	The digestive system breaks up food so that it can be absorbed by the body and used as fuel by the cells.	**TRUE**	**FALSE**
7.	An organ is a part of the body made up of different kinds of tissue and performs specific functions.	**TRUE**	**FALSE**
8.	The brain is located in the dorsal cavity.	**TRUE**	**FALSE**
9.	The study of the workings and functions of living things is called physiology.	**TRUE**	**FALSE**
10.	Veins are tough, flexible tissues that give shape to the body.	**TRUE**	**FALSE**

B. DIRECTIONS: Refer to the chart and reading selection on human body systems to complete the sentences below.

1. Bones and cartilage are part of the _____ system.

   a. muscular b. endocrine c. skeletal d. reproductive

2. The _____ system uses blood to carry food and oxygen to the body's cells and waste away from cells.

   a. excretory b. respiratory c. nervous d. circulatory

3. Both the brain and spinal cord are parts of the _____ system.

   a. circulatory b. nervous c. skeletal d. digestive

4. Breathing is a major function of the _____ system.

   a. excretory b. muscular c. respiratory d. circulatory

5. The shape of the body is determined by the _____ system.

   a. respiratory b. muscular c. skeletal d. endocrine

6. The _____ system is responsible for the hormones that control the activity of the body's organs.

   a. digestive b. endocrine c. circulatory d. nervous

7. Offspring are created through the workings of the _____ system.

   a. reproductive b. muscular c. endocrine d. skeletal

8. The heart, veins, arteries, and capillaries are the main organs in the _____ system.

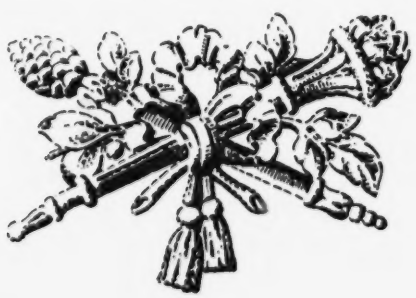
   a. excretory b. digestive c. nervous d. circulatory

9. The _____ system aids the body in movement with the help of organs such as tendons, bones, and ligaments.

   a. endocrine b. muscular c. reproductive d. respiratory

10. Organs that work together to perform functions of the life processes are called _____.

    a. glands b. hormones c. muscles d. systems



OBJECTIVE: To interpret diagrams

DIRECTIONS: As you read the following selection, pay attention to the meaning of the underlined key words. Knowing their meaning will help you understand the diagrams and complete the exercises that follow.

THE REPRODUCTIVE SYSTEM

PART I

The Female Reproductive System

The internal female reproductive organs are the ovaries, the fallopian tubes, the uterus, the cervix, and the vagina. All of these organs are located in the lower abdomen in the **pelvic** area.

The **ovaries** are two oval glands. They are attached to the sides of the pelvis. The ovaries have two functions. They produce hormones. A hormone is a chemical messenger that helps certain body parts coordinate their work. These hormones affect the sexual characteristics of a female, including body shape and development. They also include the pattern of hair growth and the distribution of fat. The second function of the ovaries is the production of reproductive cells, called ovum, or eggs.

The **fallopian tubes** act as ducts for the ovaries. Either of the two tubes can guide the egg from an ovary to the uterus.

The **uterus**, or womb, is a small, hollow organ located between the bladder and rectum. The uterus will house and nourish a developing child until it's time for it to be born.

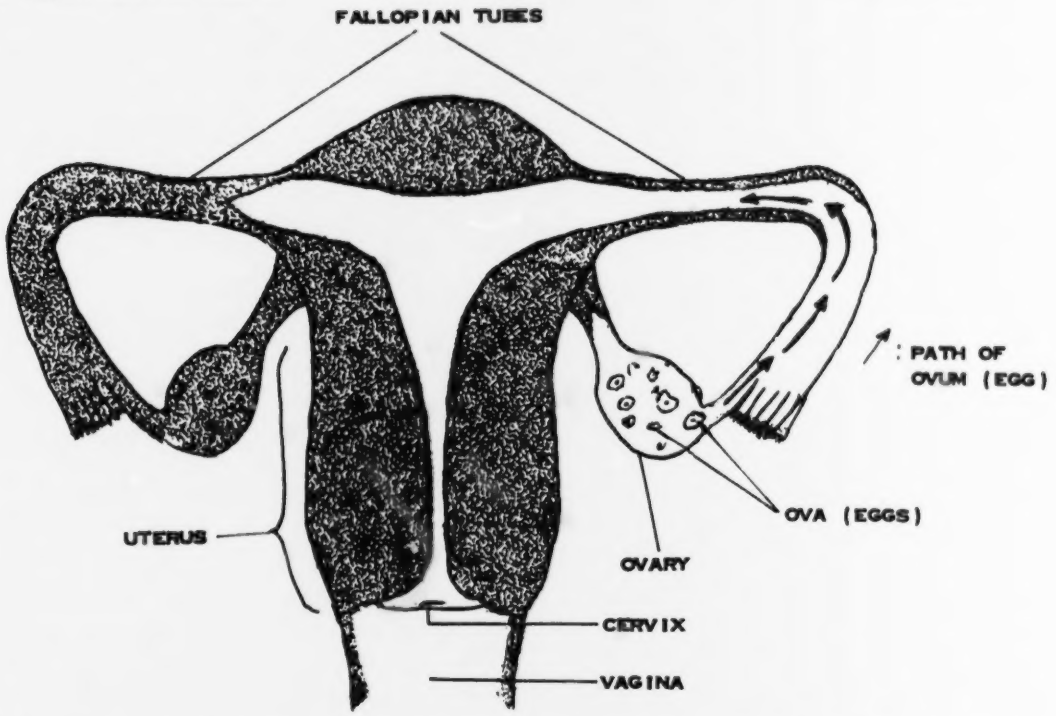
At the lower end of the uterus is the **cervix**. It opens into the **vagina**, a passageway about four inches in length. The vagina is located between the bladder and the rectum. Its walls are elastic. They stretch during intercourse or during the delivery of a baby. Afterwards, they shrink back to their normal size.

About every 28 days, an ovary releases a mature egg. This process is called **ovulation**. With a gentle, wavelike motion, one of the fallopian tubes pulls the egg inside. While the egg is in the fallopian tube, it can be **fertilized**. That is, a male sperm cell can unite with the female egg.

It takes about six days for the egg to travel down the fallopian tube to the uterus. In the meantime, the lining of the uterus is thickening and becoming rich with blood. When an unfertilized egg reaches the uterus, a hormone separates the lining from the wall of the uterus. The unfertilized egg and the blood from the lining then pass out of the body through the vagina. The entire process is called a **menstrual cycle**.

If an egg has been fertilized, it will embed itself in the lining of the uterus where it will develop into an embryo. An **embryo** is an unborn child at its first stage of growth. At this point, the female is pregnant. If for some reason a fertilized egg does not attach itself to the wall of the uterus, the egg will dissolve. The female is not pregnant.

FEMALE REPRODUCTIVE ORGANS



A. DIRECTIONS: Complete the the sentences below with key words from the reading selection.

1. The organs which produce hormones that determine sexual characteristics and produce eggs are called _____.

2. The _____ serve as ducts for the ovaries. Either of them can guide an egg from the ovary to the uterus.

3. At the end of the uterus is a small passageway called the _____. It opens into the vagina.

4. The _____ is an elastic tube located between the bladder and the rectum.

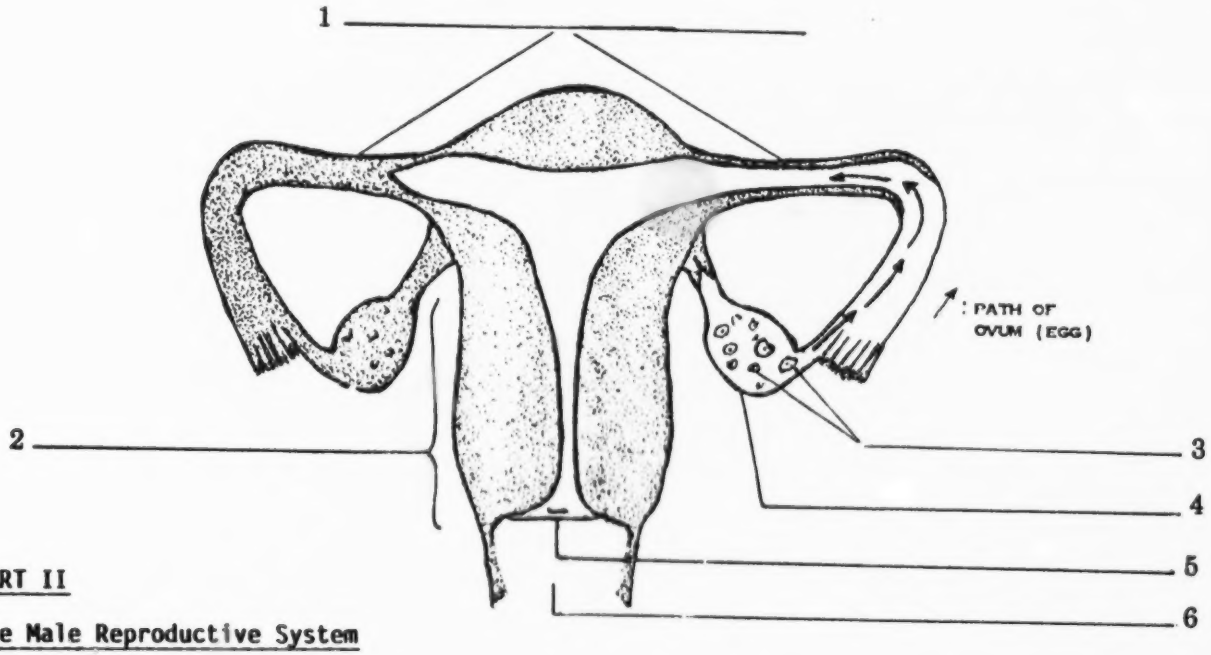
5. When an egg unites with a sperm, the egg is _____.

6. The process by which an ovary releases a mature egg is called _____.

7. An unborn child during its first stage of growth is called an _____.

8. A woman is pregnant when the fertilized egg attaches itself to the wall of the _____.

B. Label the parts of the diagram below.



PART II

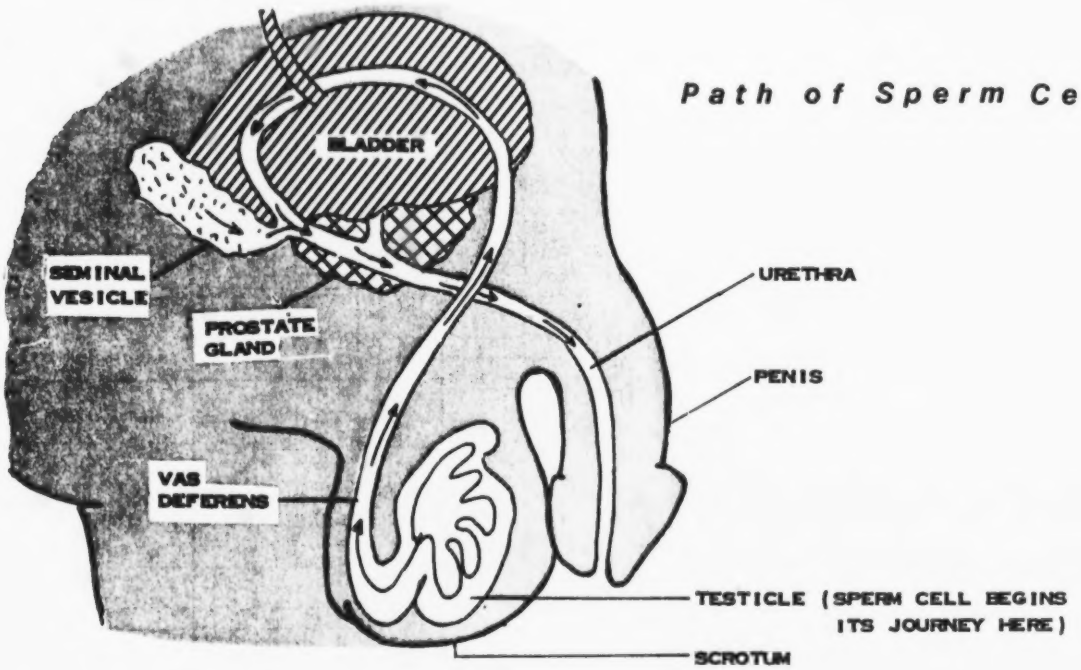
The Male Reproductive System

The external male reproductive organs are the **testicles** and the **penis.** The testicles have two main functions. The first function is to produce the hormones which direct the body to develop male characteristics. Some of these characteristics are body shape and hair growth. The second function is to produce sperm. It is the sperm which must unite with the egg in order to form a baby. The testicles are contained in the scrotum. The **scrotum** is a pouch of skin surrounded by a muscle. The muscle can contract and pull the testicles close to the body or it can relax and let the testicles hang further away from the body. This is important because sperm can only be produced at temperatures lower than the normal body temperature of 98.6 degrees Fahrenheit. The scrotum acts as a heat regulator for the testicles.

Lying over the scrotum is a round shaft of tissue called the **penis.** There are no muscles or bones in the penis. During sexual excitement, the tissue of the penis fills with blood, enlarging it and making it rigid. For reproduction to take place, the penis is inserted into the vagina. The friction of the penis against the walls of the vagina causes muscle contractions, or an **orgasm.**

During an orgasm, sperm leave the testicles by way of tubes called **vas deferens.** They travel through these tubes until they reach the **seminal vesicles.** The seminal vesticles secrete (release) a fluid that makes the sperm swim faster. They pass by the **prostate gland.** This gland produces a fluid that combines with the fluids from the seminal vesicles and the sperm. Together, the fluids and the sperm are called **semen.** The semen is then pumped down the **urethra,** a tube inside the penis.

The semen leaves the penis. In the semen are millions of sperm. They swim from the vagina through the cervix and the uterus to the fallopian tubes. One and only one will unite with a female egg. (See the diagram below for organs of the male reproductive system.)



A. DIRECTIONS: Complete the sentences below using key words from the reading selection.

1. The sperm originate from the two _____ which are located in the scrotum.

2. The _____ is a sac of flesh which is lined with a muscle. The muscle can tighten and bring the testicles closer to the body or loosen and allow the testicles to hang away from the body.

3. The sperm leave the testicles through tubes called the _____.

4. The _____ produce a fluid to make the sperm swim faster.

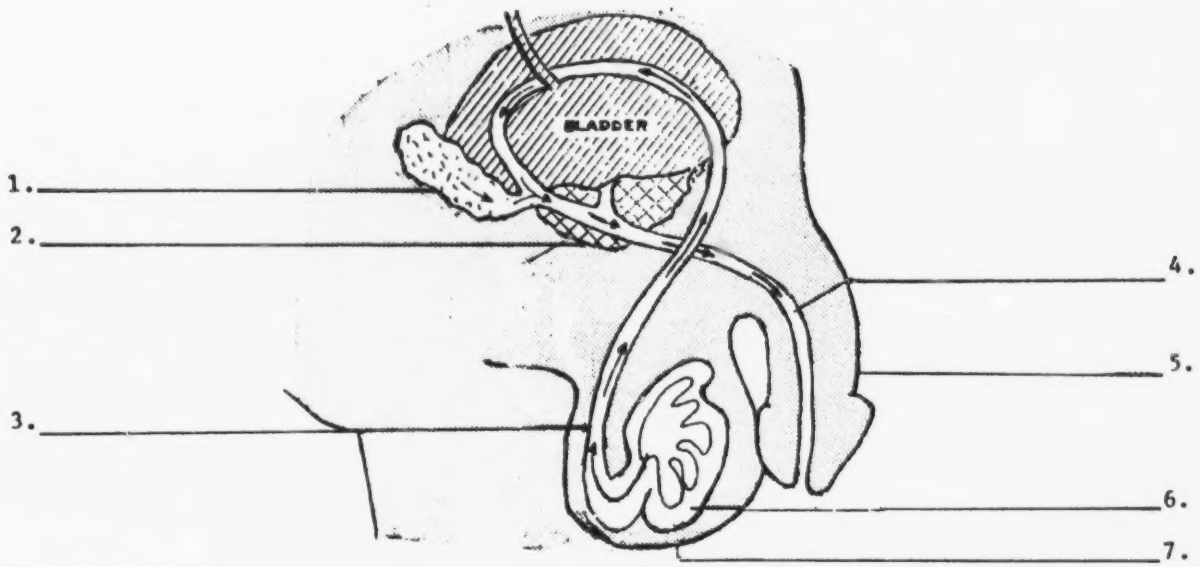
5. The sperm then pass by the _____.

6. The sperm in combination with the fluids from the seminal vesicles and the prostate gland make up the _____.

7. The sperm are then pumped down a tube called the _____.

8. The urethra is located in a round shaft of tissue called the _____.

B. Label the parts of the diagram below.



OBJECTIVE: To interpret diagrams

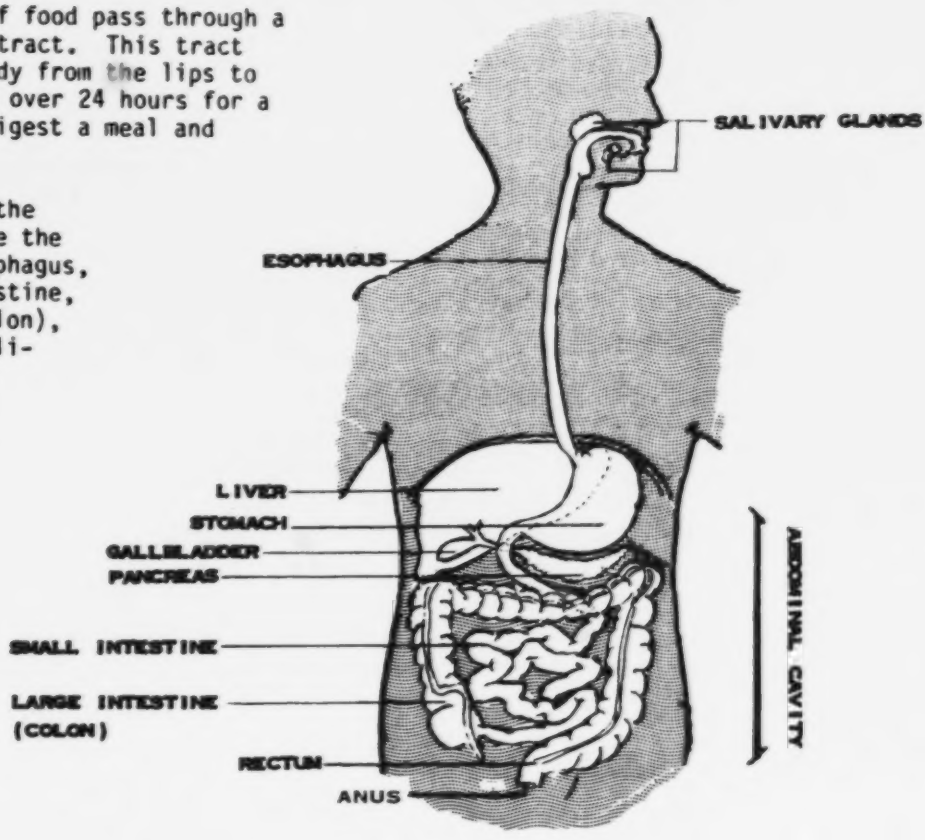
DIRECTIONS: Before you begin reading, look at the diagrams and subtitles. As you read, notice how the underlined key words are used.

THE DIGESTIVE SYSTEM

Most foods are made up of molecules that are too complex to be absorbed by the body. Food must be dissolved and broken down into basic nutrients so that it can enter the cells and provide energy. This chemical change, **digestion**, is brought about mainly by enzymes. Enzymes change the chemical makeup of other substances without themselves being changed. Digestive enzymes break the complex molecules of food into simple nutritional molecules. The nutrients can then be absorbed by the bloodstream and carried to the cells to build them up or provide energy. For example, table sugar cannot be absorbed into the bloodstream. Enzymes break it down into the molecules of a simple sugar. Special chemicals in the salivary juice in the mouth, gastric juice in the stomach, and juices in the intestines help to break down food.

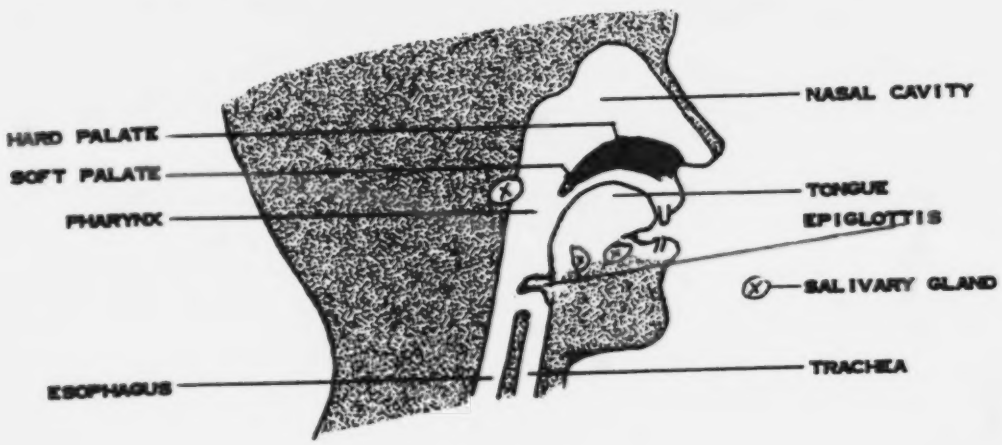
The elements of food pass through a 30 to 40-foot long tract. This tract runs through the body from the lips to the anus. It takes over 24 hours for a healthy person to digest a meal and eliminate waste.

The organs of the digestive system are the mouth, pharynx, esophagus, stomach, small intestine, large intestine (colon), and rectum. The salivary glands, liver, gallbladder, and pancreas also aid the process of digestion.



The Mouth

At the sight, smell, and taste of food, the **salivary glands** are activated to secrete a greater flow of saliva. These glands lie beneath the tongue, beneath the mucous membrane that lines the inside of the cheeks, and beneath the ears.



When food is eaten, it is cut and chopped by the teeth. It is shredded by the action of the tongue against the hard palate. Saliva contains enzymes that start the process of breaking down carbohydrates (starches and sugars). Saliva, which is mainly water, moistens the food to prepare it for swallowing. The tongue carries the ball of food to the back of the mouth. Here, it is swallowed by the action of the pharynx.

The Pharynx and Esophagus

The **pharynx** is the first portion of the esophagus, the tube that leads to the stomach. Swallowing begins as a conscious, voluntary action. Once it starts, it becomes automatic. Just in front of the phraynx lies the trachea (windpipe) that leads to the lungs. A fold of membrane, the **epiglottis**, acts as a lid to the trachea when swallowing occurs. This keeps food from going down the wrong way. After the swallowing process, the epiglottis relaxes so that breathing can continue.

Food is passed through the esophagus by muscular contractions. Muscles contract behind the food and relax in front of it. This pushes it along through the esophagus to the stomach. Food and waste are moved in this way throughout the digestive tract. This is automatic and not under voluntary control.

The Stomach

The stomach lies at the top of the abdominal cavity. It is pear-shaped and has muscular walls. It can expand and shrink to accomodate the amount of food put into it. It can hold about one and a half quarts.

Gastric juice is secreted by the stomach. This yellow fluid contains an enzyme and an acid that help to digest proteins. The acid enables the enzyme to act, dissolves some minerals, and destroys many bacteria that are in food. Thick **mucus** secreted by the stomach keeps the acid from harming stomach tissue. Food stays in the stomach for about two hours before it slowly passes to the first part of the small intestine.

The Small Intestine

The small intestine is a coiled tube about 25 feet long and an inch wide. It contains thousands of tiny glands which produce enzymes to complete the digestion of proteins and carbohydrates. Hormones activate the gallbladder and pancreas to send their secretions into this area.

The lining of the small intestine is made up of millions of tiny, fingerlike projections called **villi**. The villi absorb most of the usable nutrients into a network of blood vessels and lymph vessels. They lead to veins. The blood in the veins carries the nutrients that are to be absorbed by the cells. The lymph vessels absorb fat to be carrjed into the body.

The Liver

In the liver, many different enzymes change nutrient molecules into products needed by individual cells. Although some nutrients are used by the liver itself, the rest are stored here to be released when necessary. When the need arises, nutrients are released into the bloodstream to be absorbed by the cells. The liver stores sugar and fat as well as amino acids for use in growth and repair. (Amino acids are the building blocks of proteins.) The liver makes and stores unused digested sugars. It also removes some waste materials from the bloodstream and changes them into a form that can be excreted through the kidneys.

The Large Intestine

The large intestine is about five feet long and two inches wide. Whatever has not been digested is fed on by its "friendly bacteria." These bacteria decay the rest of what started out as a meal. The large intestine stores and eliminates waste products. Waste products are fiber, broken down cellular materials, used-up enzymes, and toxins. Non-digestible fiber provides bulk for the movement of these products out of the body. This fiber can be found in the skin of fruit and vegetables and in cereals. The waste is stored in the **rectum**, the lowest portion of the large intestine. The anal muscle (sphincter) allows the waste to be expelled from the body.

A. DIRECTIONS: List the numbered and lettered parts of the following diagrams.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Diagram I

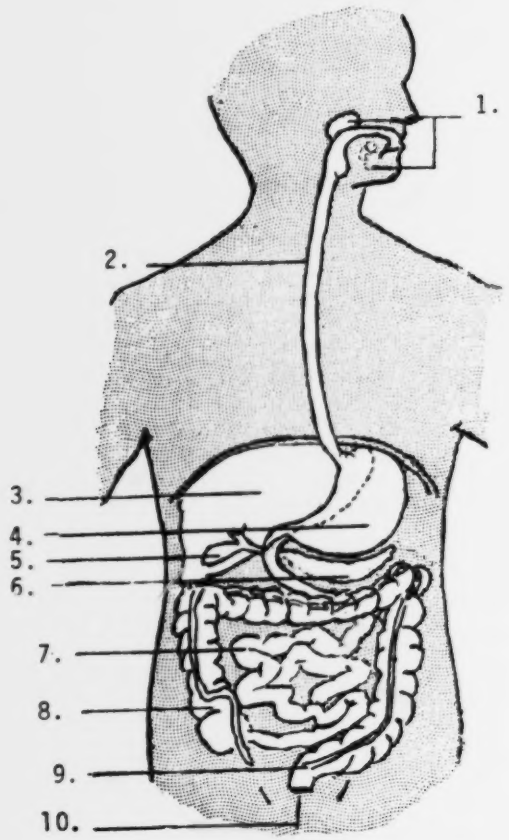
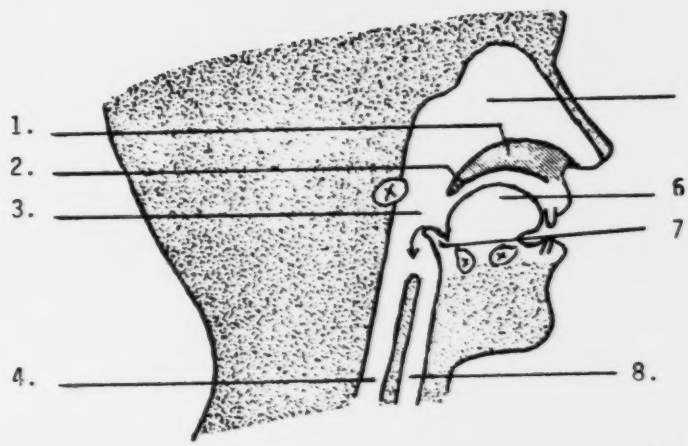


Diagram II



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
(X) _____

B. **DIRECTIONS:** Write **true** or **false** before each statement.

_____ 1. Salivary glands are located in the area of the mouth.

_____ 2. The first part of the esophagus is the trachea.

_____ 3. The stomach is located near the top of the abdominal cavity.

_____ 4. The colon is another name for the small intestine.

_____ 5. The small intestine is longer than the large intestine.

_____ 6. The digestive tract circulates blood through the body.

_____ 7. The liver acts as a storage area for sugar, fat, and amino acids.

_____ 8. The anal muscle allows waste from the rectum to be released from the body.

_____ 9. The rectum is located at the lowest portion of the large intestine.

_____ 10. The digestive tract runs from the stomach to the rectum.

C. **DIRECTIONS:** Answer the following questions.

1. What purpose do enzymes serve in the digestive process? _____

_____

2. How long does it take for a healthy person to completely digest a meal? _____

_____

3. What is the role of the salivary glands in the digestive process? _____

_____

4. What purpose does the gastric juice in the stomach serve? _____

_____

5. What purpose does fiber serve in the large intestine? _____

_____

OBJECTIVE: To interpret diagrams

DIRECTIONS: Before you begin reading, look at the subtitles and diagrams. As you read, notice how the underlined key words are used.

THE CIRCULATORY SYSTEM

PART I

The body parts usually associated with the **circulatory system** are the heart, arteries, veins, and capillaries. However, anything that contributes to the flow of blood is also part of this system. This includes bone marrow, the network of capillaries inside the lungs, stomach, small intestines, kidneys and liver, the spleen, and more. The circulatory system carries nutrients, oxygen, and repair factors throughout the body. The repair factors enable the body to maintain freedom from injury and disease. Blood and lymph circulate these to all the cells. They also carry waste products that are produced as a result of the use of oxygen by the cells to change nutrients into energy.

The Components of Blood

Plasma is a clear, yellowish liquid that makes up over half of the blood. It is mostly water. Floating in the plasma are white cells, platelets, and enzymes. Food molecules, cellular waste, and other substances are also carried in the plasma.

Red cells are thin disks with a squeezed-together middle. They have no nucleus. The red coloring comes from hemoglobin. **Hemoglobin** is a red iron compound that oxygen attaches onto. In the lungs, the red cells unite with oxygen. When they pass through a tissue that is low in oxygen, the hemoglobin releases its load of oxygen and is carried to the lungs to pick up more oxygen. The iron content goes to the long bones to make new red blood cells.

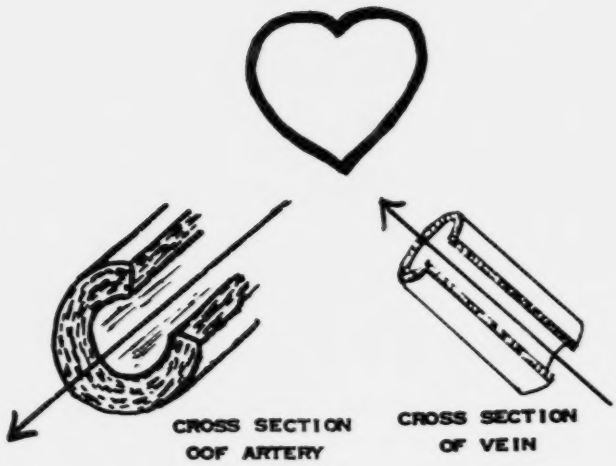
White cells are much larger than red cells. Clear and colorless, they have no definite shape and contain one or more nuclei. White cells can move anywhere in the body to help fight infection. They engulf germs to prevent them from multiplying and causing disease.

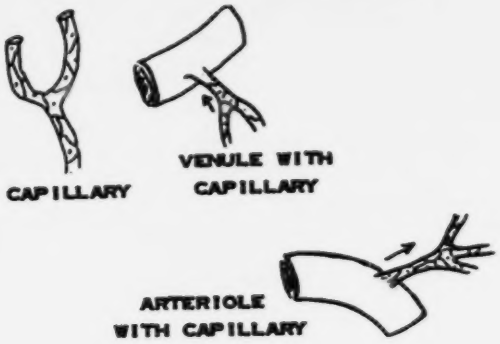
Platelets are small bodies that start the clotting process. Clotting protects the body by preventing germs from entering it. It also prevents an unending flow of blood from leaving the body. If the blood couldn't clot, a cut vein would bleed in a steady stream.

Blood proteins help clotting to proceed when the body is injured. They also keep water from escaping through the walls of blood vessels. Some blood proteins unite with food molecules and carry them throughout the body.

The Circulation of Blood

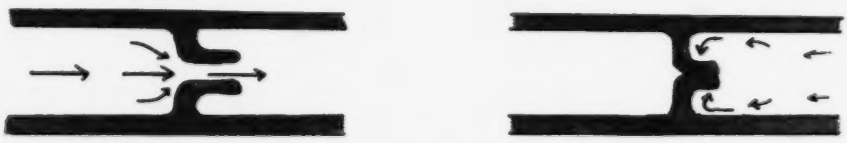
The heart pumps blood around the body through tubes called blood vessels. There are three kinds of blood vessels. They are the arteries, capillaries, and veins. **Arteries** carry blood away from the heart. They have thick but flexible walls to withstand the surge of pressure from newly pumped blood. The pulse you can feel in your wrist is from an artery that lies near the surface of the skin on the wrist. The pulsation of blood travels the length of each artery. Because of this pulsation, blood bleeds in spurts from a cut artery. To provide oxygen and nutrients to tiny cells, arteries branch into smaller tubes called **arterioles**. The arterioles, in turn, branch into even smaller blood vessels called **capillaries**.





Because the walls of capillaries are only one cell thick, molecules can pass back and forth through them. This is how oxygen and nutrients reach all of the body's cells. In the same way, molecules of most cellular waste materials pass out of the cells and into the capillaries. Used blood then goes from the capillaries into small tubes called **venules**. The venules lead into the **veins**, which carry the blood back to the heart from there to pick up a new load of nutrients and oxygen.

Much of the pressure from the pumping action of the heart has been lost by the time blood reaches the veins. Therefore, blood in the veins moves more slowly than blood in the arteries. To ensure that venous blood will not move in the wrong direction, veins have one-way valves in them. **Valves** are membranes that control the flow of blood through a passage. The valves keep blood flowing toward the heart to be purified.



DIRECTIONS: Write **true** or **false** below each statement.

_____ 1. Blood flows away from the heart through veins.
_____ 2. Plasma is the red coloring in blood.
_____ 3. White blood cells aid the body in fighting infection.
_____ 4. The substances that start the clotting process are called platelets.
_____ 5. Capillaries are larger than any other blood vessels.
_____ 6. Arteries carry blood away from the heart.
_____ 7. Capillary walls are one cell thick.
_____ 8. Blood flows from the arterioles into the capillaries.
_____ 9. The clotting of blood prevents it from bleeding in a steady stream.
_____ 10. Blood in the veins flows faster than blood in the arteries.

PART II

NOTE: In Diagram I, the structure of the heart is simplified to show how blood enters and leaves it. To make any diagram as simple as possible, structures may be shown in different positions than in life. Structures may be omitted or made much smaller or larger. Diagram II looks more like an actual human heart.

The Heart and How it Works

The main organ involved in circulation is the heart. It is like two pumps placed side by side. The two pumps do not connect with one another. In each pump there is an upper chamber, the **auricle**, and a lower chamber, the **ventricle**. Veins bring blood into the upper chambers. When the heart contracts, blood is sent to the lower chambers. A **valve** between upper and lower chambers then seals them apart, leaving the blood nowhere to go except through the major artery which starts in the ventricle.

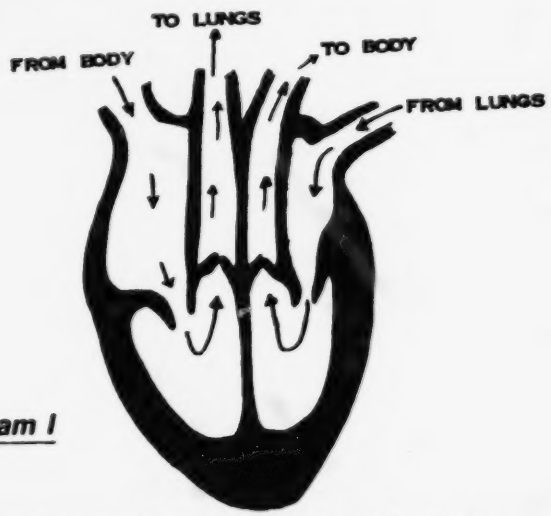
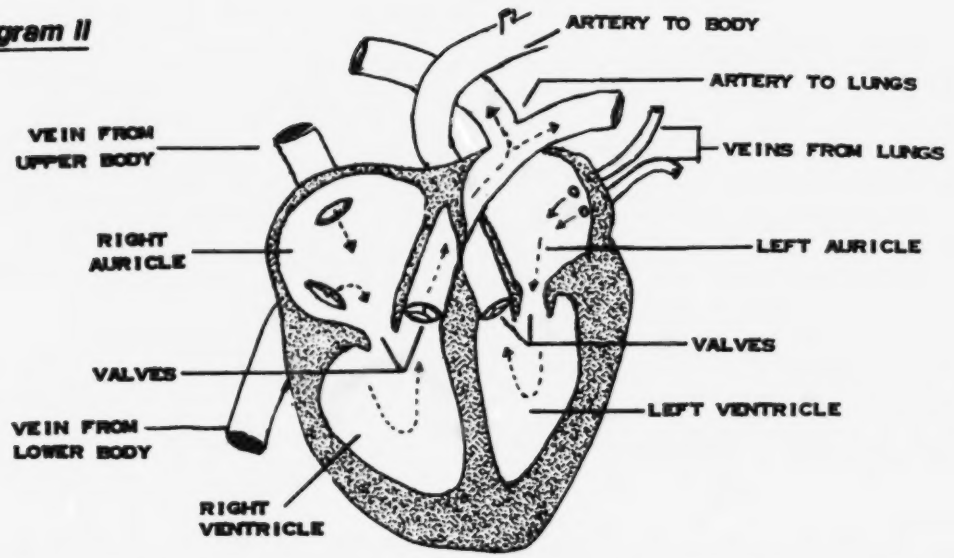


Diagram I

Blood with depleted oxygen (a lowered amount of oxygen) comes through veins into the right auricle. The heart contracts. Then blood is pumped downward into the right ventricle. The valve between the auricle and the ventricle closes, and the blood is pushed through the pulmonary (lung) artery that begins in the right ventricle. This artery branches into each lung, where the blood travels to pick up oxygen.

Diagram II



After the blood picks up oxygen, veins return it to the left auricle. As the heart contracts, the blood is sent to the ventricle. The valve closes and the blood leaves by way of the **aorta**. This is the largest artery in the body. This artery divides into smaller arteries. These arteries lead to the arms, stomach, liver, kidneys, intestines, and so forth. The arteries then branch into arterioles and tiny capillaries. Oxygen, nutrients, and repair factors are transferred from the blood to the body parts. The blood circulates from the capillaries to the venules, then to the veins. The veins return it to the heart.

A. DIRECTIONS: Compare the two diagrams of the heart. Name at least four differences between Diagrams I and II.

1. _____

2. _____

3. _____

4. _____

B. DIRECTIONS: Circle the letter of the correct answers to the multiple choice questions.

1. The upper chambers in the heart are called:

   a. valves b. auricles c. ventricles d. arteries

2. The lower chambers in the heart are called:

   a. arteries b. auricles c. valves d. ventricles

3. The largest artery in the body is:

   a. the artery to the heart from the lungs
   b. the artery from the heart to the body
   c. the valve that divides the auricles and ventricles

4. Explain the steps involved in the flow of blood through the body, including the lungs.

OBJECTIVE: To interpret diagrams

DIRECTIONS: The anatomy of the breathing process is illustrated in the diagram. Reinforce your understanding by referring to it as you read.

THE RESPIRATORY SYSTEM

It is necessary to exchange used air for new air because the body needs a continuous supply of oxygen. The oxygen is used to release energy in the cells. The respiratory system is made up of organs that bring oxygen into the body and remove carbon dioxide and other waste gases from it. The respiratory process includes:

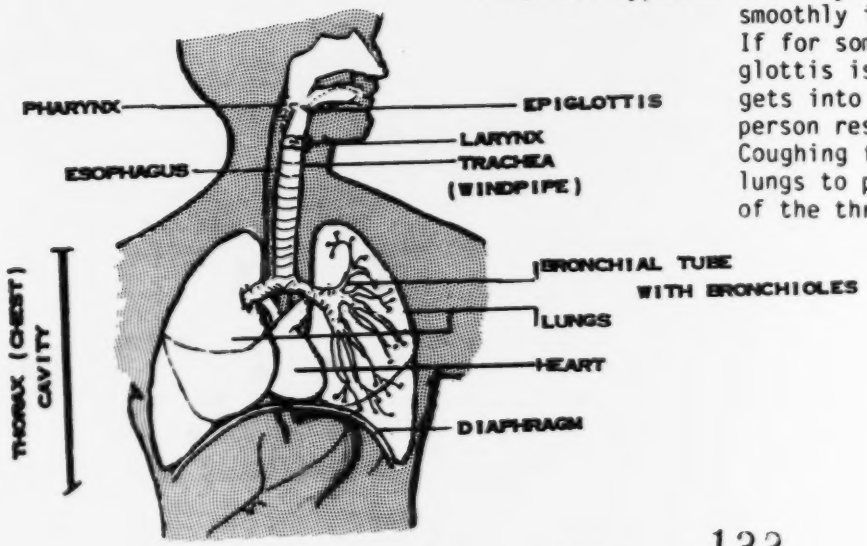
1. inhaling oxygen into the body,
2. using oxygen in the cells to release energy, and
3. exhaling the waste (carbon dioxide and water vapor) from cells.

The organs in the system are the lungs and passages that connect them with the outside air. These passages include the mouth and nasal passges, pharynx, trachea, larynx, bronchi, and lungs.

The Upper Respiratory System

The nose is lined with tiny hairs that grow through a film of mucus that coats the nostrils. The hairs trap some of the small particles such as dust, pollen, and soot in the air. Breathing through the nose helps to moisten the air; it also brings the temperature of the air closer to that of the body.

After air enters the nose or mouth, it passes through the **pharynx**. This is an area shared by the respiratory and digestive systems. From the pharynx, air travels through the **larynx**, or voice box. However, when food is being swallowed, the air passage is blocked off by the epiglottis. This fold of tissue acts as a lid to the larynx. Thus, food bypasses the larynx and slides smoothly into the esophagus. If for some reason the epiglottis is open and food gets into the larynx, a person responds by choking. Coughing forces air from the lungs to push the food out of the throat.



Sound is produced in the larynx. Each side of the larynx has a band of firm tissue. These tissues are called **vocal cords**. They can be stretched to allow air to pass between them. As they stretch, the rush of air causes them to vibrate and create sound.

From the larynx, air passes through the **trachea**, or windpipe, to the lungs. The trachea is banded by rings of cartilage. These protect it and keep it open. The lining of the trachea is made of tiny, hairlike structures called **cilia**. The cilia sweep upward, carrying dust toward the nose and mouth. Coughing and sneezing carry the dust particles out of the windpipe.

Lung Structures

In the chest cavity, the trachea branches into two tubes called **bronchi**. One of these leads into each lung. Once inside the lungs, they branch into several tubes called **bronchial tubes**. At the end of each bronchiole is a structure that contains tiny blood vessels called **capillaries**. Red blood cells circulating through the capillaries absorb oxygen that has been taken into the lungs. At the same time, carbon dioxide passes from the blood in the capillaries into the air in the bronchioles.

The Mechanics of Breathing

The action of nature is to equalize air pressure. This is why air moves out of high pressure areas into low pressure areas on the earth's surface. It also accounts for the reason why air rushes into and out of our lungs.

The body accomplishes this equalization of air pressure by using nerves and muscles. When carbon dioxide builds up in the blood, nerve endings in the arteries are stimulated to signal the brain. The brain relays the message to the diaphragm and the muscles located between the ribs. The **diaphragm** is a sheet of muscle that makes up the floor of the chest. It extends from one side of the body cavity to the other. Muscle fibers in the diaphragm contract and pull it downward. At the same time, the rib muscles pull the ribs upward and outward. These actions increase the size of the chest cavity. Because of this expansion, the air pressure in the chest is lower than the pressure of the atmosphere. For this reason, we inhale. Air quickly fills the nose or mouth and rushes to the lungs. When the lungs are enlarged with air, there is more air pressure in the chest cavity than in the outside air. While the lungs have been enlarging, carbon dioxide has been building up in the blood. Its presence once again triggers a message to the brain, and the diaphragm and rib muscles relax, pushing against the lungs so that they contact. Air and water vapor are pushed out as we exhale.

A. DIRECTIONS: Circle the letter next to the word or words that complete each sentence.

1. The epiglottis is _____ the chest cavity.

   a. below b. above c. within d. around

2. _____ passes from the trachea into the lungs.

   a. blood b. a vein c. an artery d. air

3. The larynx contains the _____.

   a. lungs b. vocal cords c. diaphragm d. trachea

4. Muscle fibers in the diaphragm relax and contract to allow _____ to take place.

   a. breathing b. blood flow c. swallowing d. heartbeat

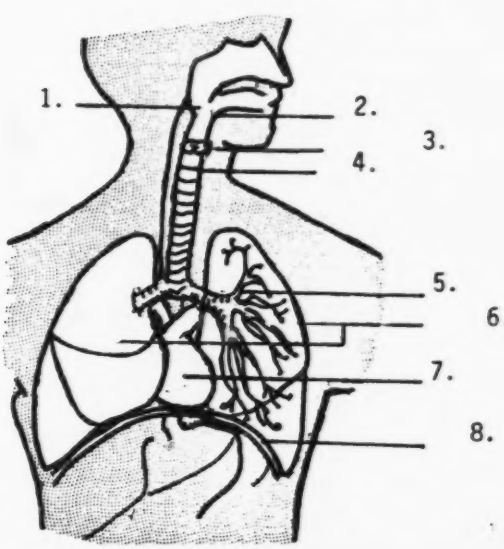
5. _____ is created in the larynx.

   a. digestion b. breath c. sound d. yawning

6. _____ protects the entrance to the larynx when food is being swallowed.

   a. a bronchiole b. an artery c. the epiglottis d. the hard palate

B. DIRECTIONS: Label the numbered parts of the diagram.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

OBJECTIVE: To classify information

To classify is to group items or ideas according to a system. The information on this page illustrates examples of classification.

FINDING THE CORRECT CLASS

Putting items or ideas in the correct class is a form of identifying the main idea. Look at the group of words below.

shrimp crab clam oyster

What do you think is the correct title for this group of words? If you said **seafood**, you are correct. However, is this title precisely correct? No. A more precise title for this group of sea creatures would be **shellfish** because all of them have shells.

Let's examine another group of words.

termites mosquitoes bollweevil lice

Are they **animals**, **insects**, or **harmful insects**? They are all of these things, but the most precise or best title for this group of creatures would be **harmful insects.**

The words below are the names of reproductive organs. If you were asked to select one organ which does not fit in this group, which would you select?

uterus ovaries testicles fallopian tubes vagina

The correct answer is **testicles** because this is a male reproductive organ, and therefore does not belong with this group of female reproductive organs.

DIRECTIONS: Before you read the selection, glance at the subheadings to see what classification of the skeletal system you will be reading about. As you read, notice the meaning of the underlined key words.

THE SKELETAL SYSTEM

Functions of Bones

The skeletal system consists of about 205 bones. Their major functions are support, protection, and movement. Bones permit the body to stand erect. They give shape to the body. They also protect delicate organs. Some bones are like levers. The muscles pull them back and forth to enable us to walk, lift, reach, and so forth.

Composition of Bones

When a baby is born, its bones are soft and pliable. As the baby grows, mineral matter is deposited and hard bone tissue forms gradually. This hardening process is called **ossification**. It occurs all through childhood. Bone tissue is extremely hard and made up mainly of cells which secrete calcium and phosphorus, Bones are hard on the outside and soft on the inside. The soft tissue inside bones is called **marrow**. This is where white and red blood cells are made. The body also stores fats and minerals in the marrow. Bones are made up of about 21% **organic**, or living, substances, and 52% chemicals such as calcium phosphate. Human beings grow until the **extremities**, or ends, of their bones harden. This occurs gradually until age 18 for females and 21 for males.

General Categories of Bones

There are four general categories of bones. They are long, flat, irregular, and short. Cartilage could probably be considered a fifth category of bones. **Cartilage** is a bone tissue which contains flexible, elastic fibers. Almost all our bones began as cartilage. It is found in our noses, ears, and between parts of the body.

Long bones have a shaft and two extremities. The shaft has a **medullary canal** which contains yellow marrow made of fat cells and many tiny blood vessels. Yellow marrow functions as a fat storage center and has cells which produce white blood cells. The two extremities contain red marrow where red and some white blood cells are made. The long bones also support the body and aid movement. Long bones form our arms and legs.

Flat bones provide protection for delicate organs. The ribs protect the lungs and various other organs. The **cranium**, a part of the skull, is made up of eight flat bones. It forms a protective housing for the brain, eyes, and inner ears. The face has fourteen bones. Some of these protect nasal passages and sinuses. The jawbone is one of the flat facial bones. These bones provide shape for the face in much the same way other bones provide shape for the body.

The spine is a long, flexible column of **irregular bones**. These are the only irregular bones in the body. The many small bones are called **vertebrae**. Separating each vertabra from the one next to it is cartilage, which acts as a cushion. The first two vertebrae, the **atlas** and **axis**, make possible the movement of the head on the neck. The spine supports the head and ribs. It also protects the spinal cord of the nervous system.

The **short bones** in the feet and ankles provide support for the body and allow for movement. The short bones forming the wrists and hands allow for a great deal of movement and flexibility. The wrist alone has eight bones while each hand has five. The five fingers have a total of 14 bones.

There are more bones in the human body than the ones discussed here. But they can still be classified by function and by shape.

A. DIRECTIONS: Underline the word which does **not** belong in each group.

1. long, short, irregular, ankle, flat
2. support, protection, breathing, movement, shape
3. reach, think, walk, lift, grasp
4. throat, extremities, medullary canal, yellow marrow, red marrow
5. wrist, hand, feet, ankles, nose

B. DIRECTIONS: Fill in the missing words in the sentences below.

1. The gradual process of the formation of hard bone tissue which begins at birth is called _____.
2. Three kinds of flat bones which help protect delicate organs are the _____, _____, and _____.
3. _____, _____, and _____, are categories of bones which help support parts of the body.
4. Fat is stored in the _____ bones. White and red blood cells are also made here.
5. The small bones of the spine are called _____.

C. DIRECTIONS: Complete the following classification chart.

	BONES	LOCATION	CATEGORY	FUNCTION
1.	Ribs	Torso	Flat	
2.	Jawbone	Face		Helps provide shape for the face.
3.		Back	Irregular	Provides support for the back.
4.	Cranium	Head		Protects the brain.
5.	Atlas and axis	Neck	Irregular	

Kinds of Joints

Joints are places where bones connect with one another. They control the amount and direction of movement between the bones. Some joints are movable. Others are partially movable. There are also joints that are immovable.

Movable joints have cartilage which cushions the place where bones connect. These major joints also contain bands of strong fiber called **ligaments** that connect bones. Movable joints contain a fluid which lubricates them in much the same way that oil lubricates certain parts of machinery. Some movable joints have tiny sacs called **bursa** which are filled with fluid. They provide an extra cushion during movement.

There are four categories of movable joints. They are hinge, ball-and-socket, pivot, and angular. Hinge joints move in one direction only. The knees and elbows are examples of hinge joints. **Ball-and Socket** joints permit movement in all directions. The shoulders and hips are ball-and-socket joints. **Angular joints** allow for movement in two directions as seen in the wrists, ankles, and the joints which connect the fingers to the palm. The placement of the angular thumb has been especially important to us. It has enabled us to grasp objects and use tools. **Pivot joints** allow for rotation but no other movement. An example of this type of joint is the **atlas** and **axis vertebrae** which allow the head to turn.

Partially movable joints are sometimes called **gliding joints**. They have flat surfaces that slide against one another to allow for limited movement. The connections between the ribs and between parts of the backbone are partially movable joints.

Immovable joints contain tough tissue which fuses, or welds, bones. Bones in the skull and pelvis are joined in this way. The ribs are attached to the spine in a similar way.

D. DIRECTIONS: Underline the word which does **not** belong in each group.

1. bursa, fluid, movement, cartilage, ligament
2. hinge, angular, skull, pivot, ball-and-socket
3. grasping, bending, fusing, communicating, rotating
4. ankles, wrists, thumbs, fingers, shoulders
5. knees, elbows, spine, shoulders, hips
6. ligament, movable, partially movable, immovable

E. **DIRECTIONS:** Complete the classification chart below.

	TYPE OF JOINT	LOCATION	FUNCTION
1.		Shoulder	Allows for movement in all directions.
2.	Hinge	Elbow and knee	
3.	Angular		Helps to grasp objects.
4.	Pivot	Atlas and axis	
5.	Angular		Allows movement in two directions.
6.	Ball and socket		Permits movement in all directions.
7.	Immovable		Protects the brain, eyes, and inner ears.
8.		Between the ribs and backbone	Allows limited movement.

OBJECTIVE: To classify information

DIRECTIONS: Before you read the selection, glance at the subheadings to see what classification of the muscular system you will be reading about. As you read, notice the meaning of the underlined key words.

THE MUSCULAR SYSTEM

Functions of Muscles

The muscular system is the largest of the body systems. There are over 650 muscles which make up 35 to 45% of our body's weight. They serve various purposes. They help move certain parts of the body. They help keep the body erect and determine posture. Muscle activity produces heat to help regulate body temperature. Muscles basically are bundles of fibers held together by connective tissue. These fibers are able to contract, shorten, and thicken. Muscles are attached to bones. cartilage, ligaments, tendons, skin, and sometimes to each other.

Substances Which Cause Muscles to Work

Muscules need oxygen and sugar in order to work. These substances are brought to the muscles by the bloodstream. Extra sugar is stored in the muscles as **glycogen**. When oxygen and sugar combine, energy that muscles can use is released. This unique chemical process is called **oxidation**. With it, muscles turn chemical energy into mechanical energy. When this occurs, heat and waste products are formed. Muscle fatigue happens when not enough oxygen is available to combine with the sugar. The result is that lactic acid forms as a by-product. This acid pools in the muscles, causing soreness.

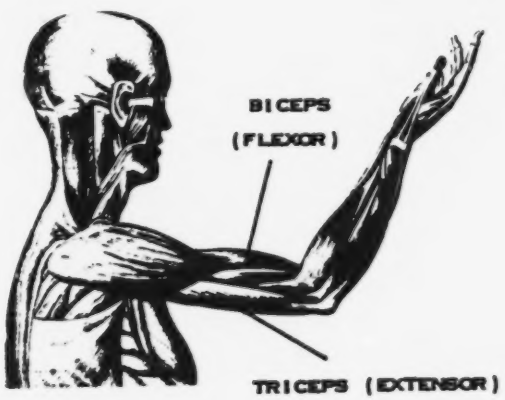
Kinds of Muscles

Muscles are controlled by the nervous system. Some muscles are called **involuntary** because they work automatically. For the most part, the workings of these muscles go unnoticed. **Cardiac** (heart) **muscles** are involuntary. The heart is a complicated system of muscles surrounding four cavities. It is controlled by its own network of nerves. As the blood flows from one cavity to another and in and out of the heart, cardiac muscles contract and then let go. **Smooth muscles** are also involuntary. They usually line the inside of an organ. Those found in the intestines help to move food along. Smooth muscles are also found in the stomach. Those inside blood vessels constrict or expand the vessels to maintain blood pressure.

The muscles that we can control are called **voluntary**. They are attached to **motor nerves**. These nerves begin in the brain or spinal cord and branch out through the muscular system. Paralysis, a condition in which we cannot move our muscles, occurs when the muscles are unable to receive messages from the nerves.

There are two kinds of voluntary muscles, sphincter and skeletal. Some **sphincter muscles** are found in the anus and urethra and control the passage of substances. Sphincter muscles are circular and move in such a way as to tighten up on themselves. These muscles are able to open or close holes within the body.

Skeletal muscles are called such because they are either directly or indirectly attached to the skeleton. Some skeletal muscles are connected to bones by tough cords of tissue called **tendons**. A tendon pulls on the bone when a muscle contracts. Tendons operate in much the same way as the strings on a puppet. Skeletal muscles can move our bones with varying degrees of speed and strength. They range in size and shape depending on the job they perform. Most of the time they are arranged in blocks. For example, in the front of our upper arm is a **flexor muscle** called the **biceps**. It pulls our lower arm forward causing it to bend or flex. Its partner, the **triceps**, is found in the back of our upper arm. It stretches as the lower arm comes forward. Then to straighten our arm, the triceps contracts pulling the lower arm down. In turn, the biceps eases its pull and returns to its normal shape. The triceps is an example of an **extensor muscle**.



Throughout our body, flexors work with extensors to enable us to move the way we do. We maintain good muscle tone by regular exercise and proper nutrition. Muscle tone is the readiness of the muscles to pull even when they are not pulling.

A. DIRECTIONS: Circle the word in each group which does not belong. Then name the category of the remaining words in the group.

1. glycogen, oxidation, paralysis, lactic acid, sugar

_____

2. posture, body temperature, movement, erect standing, thinking

_____

3. biceps, soreness, fatigue, paralysis

_____

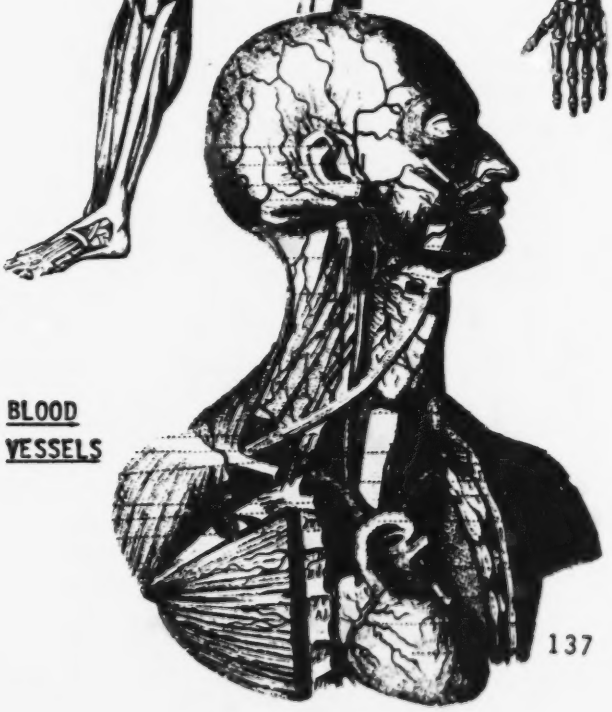
4. cardiac muscle, sphincter muscle, skeletal muscle

5. movement, bones, tendons, cartilage, nerves

B. DIRECTIONS: Fill in the following classification chart.

	TYPE OF MUSCLE	LOCATION	FUNCTION
1.	Sphincter	Anus, Urethra	
2.	Cardiac		Helps to regulate the flow of blood.
3.		Intestines	Helps move food along.
4.	Skeletal	Biceps	
5.	Smooth		Expands or relaxes walls of the vessels to maintain blood pressure.

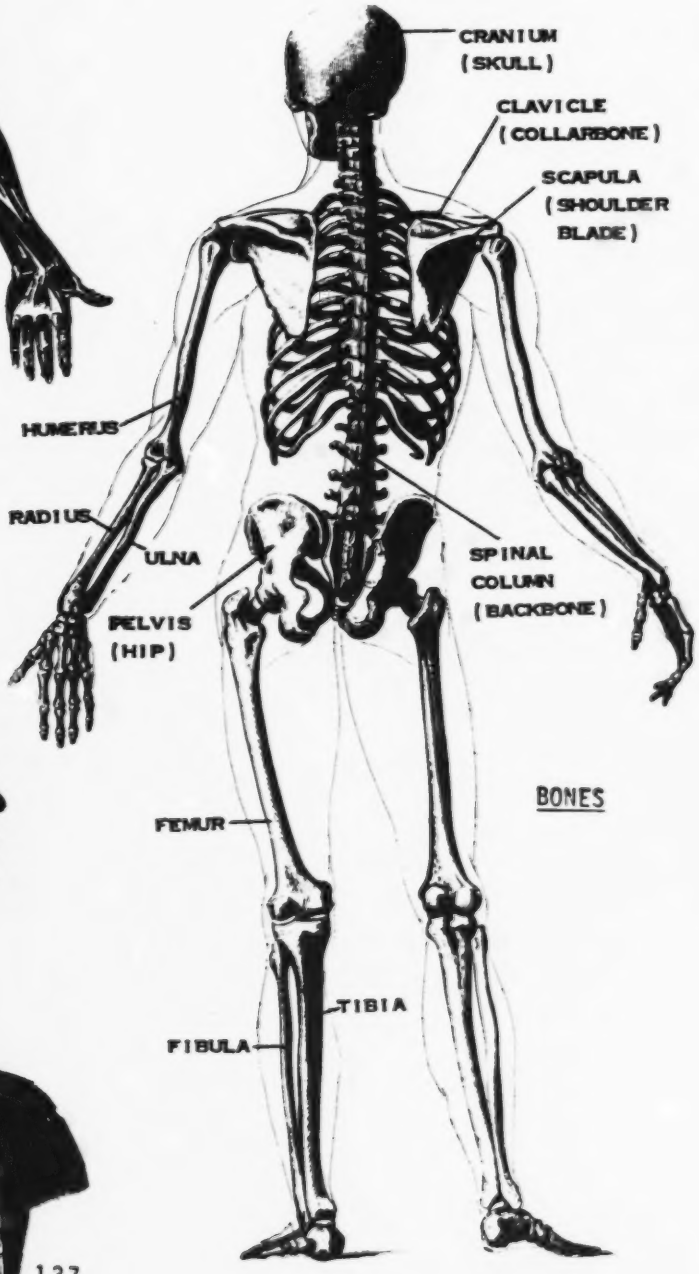
MUSCLES
and TENDONS



BLOOD
VESSELS

137

Anatomical Drawings from 1851



BONES

OBJECTIVE: To classify information

DIRECTIONS: Before you read the selection, glance at the subheadings to acquaint yourself with the major parts of the nervous system. As you read, notice the meaning of the underlined key words.

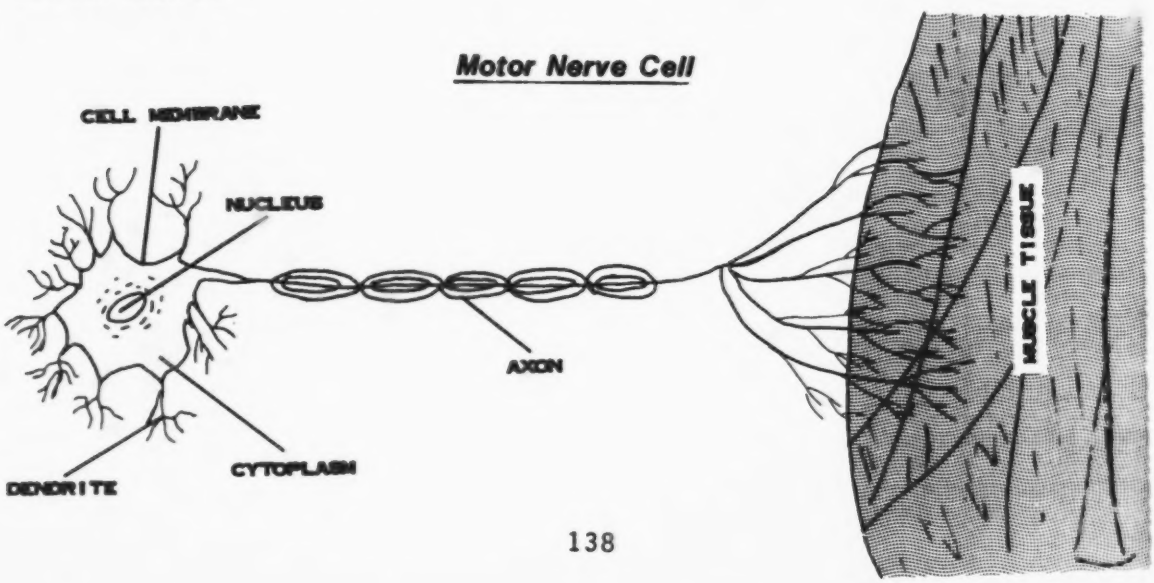
THE NERVOUS SYSTEM

The **nervous system** is the most complex network in the body. It is made up of the brain, the spinal cord, and the nerves. There are three parts to the nervous system: the central nervous system, the peripheral nervous system, and the autonomic nervous system. The **central nervous system** is made up of the brain and spinal cord. The **peripheral nervous system** consists of all the nerves in the body. The **autonomic nervous system** consists of special nerve cells called **ganglia** which lie on either side of the spinal cord.

The Nerve Cell

The **nerve cell**, or neuron, has a nucleus, cytoplasm, and a cell membrane like most other cells in the body. In addition, it has dendrites and axons. **Dendrites** are like long fingers reaching out from one end of the cell. They receive messages, or impulses, from the nearby nerve cells. The impulses are transmitted through the cell to the axon. The **axon** is a long tail formed at the other end of the cell. It passes the impulse to another neuron, a muscle, or a gland. Nerve cells from the brain to the extremities can be as much as three feet long.

The nervous system is responsible for sending messages from the brain to the rest of the body through a chain of individual nerve cells. Nerve cells are built with such efficiency that messages are transmitted all over our bodies with incredible speed. All neurons are able to react when stimulated and pass their stimulation from one to another. Nerves are chains of these stimulus conductors wrapped up with small blood vessels inside connective tissue. These "electric cords" spread throughout our bodies.



The Central Nervous System

The brain and the spinal cord form the **central nervous system**. The brain is the center for organizing, interpreting, and storing messages from the nerves. It is the center of decision, action, and our very humanness. The brain is a soft mass of gray and white nerve tissue. "Gray matter" consists of millions of neurons and naked nerve fibers. The brain has three sections: the brain stem, the cerebrum, and the cerebellum. The **brain stem** has many parts. One part is the **medulla** which is responsible for controlling heartbeat, coughing, swallowing, and breathing. The **cerebrum** is the largest part of the brain. It is the center of reasoning, memory, thought, speech, and sensation. This part of the brain is divided into two **hemispheres**, or halves. The **left hemisphere** controls voluntary movement on the right side of the body. The **right hemisphere** controls voluntary movement on the left side of the body. (The eyes are the only parts of the body that do not respond to the opposite side of the brain.) The **cerebellum** coordinates muscular movements and monitors those movements for steadiness. It is also divided into two hemispheres. The left hemisphere controls the right side of the body and vice versa.

The **spinal cord** is located in the back (the dorsal cavity) and is protected by vertebrae. It has two functions. The first is to serve as the main pathway or conductor to and from the brain. The second is to serve as a reflex center. There are times when we must react very quickly in order to survive. These kinds of reactions or immediate reflexes are programmed in the spinal cord. As a reflex center, it makes connections between incoming and outgoing nerve fibers. For instance, if you touch a hot stove, your hand will automatically pull away. This is because the feeling or sensory neurons sent the message, "Hot! Pain!" This message was connected to a motor, or movement, nerve in the spinal cord which ordered the muscle to pull away. This entire cycle is called a **reflex arc**.

The Peripheral Nervous System

The **peripheral nervous system** is involved in body action and decision. It consists of twelve pairs of cranial nerves extending from the brain and thirty-one pairs extending from the spinal cord. There are three types of nerves in this system. They are sensory nerves, motor nerves, and mixed nerves. The **sensory nerves** emerge from the skin or sense organs to carry back messages toward the spinal cord or brain. The **optic nerve** is an example of a sensory nerve. It carries messages from the eyes to the brain. **Motor nerves** carry messages from the brain and spinal cord to the muscles and glands. They conduct an electro-chemical impulse that causes movement. They emerge from the part of the spinal cord closest to the center of the body. **Mixed nerves** carry both motor and sensory nerves. These are found mostly in the spinal cord.

The Autonomic Nervous System

The **autonomic nervous system** regulates the vital organs such as the heart, blood vessels, lungs, kidneys, and so on. Since this system is not under conscious control, it is automatic, or **autonomic**. This system has two operating conditions: The sympathetic and the parasympathetic. The **sympathetic** condition operates when we feel strong emotion such as fear. It will prepare the body with extra energy for running or fighting. The **parasympathetic** condition counteracts it. The pair keep the responses of our vital organs in balance.

A. DIRECTIONS: Classify each word below under the appropriate heading which follows.

reasoning	mixed nerves	interpreting
central nervous system	parasympathetic condition	peripheral nervous system
nucleus	axons	brain stem
spinal cord	autonomic nervous system	cerebrum
sensory nerves	dendrites	memory
cytoplasm	voluntary movement	controlling heartbeat
sympathetic condition	brain	cerebellum
motor nerves	reflex	cell membrane

1. **Parts of the Nervous System**

_____

_____

_____

2. **Parts of the Neuron**

_____

_____

_____

_____

3. **Central Nervous System**

_____

_____

_____

_____

_____

_____

4. **Functions of the Central Nervous System**

_____

_____

_____

_____

_____

_____

5. **Peripheral Nervous System**

_____

_____

_____

6. **Autonomic Nervous System**

_____

_____

B. DIRECTIONS: Complete the classification chart below.

	STRUCTURE	LOCATION	FUNCTION
1.	Medulla	Brain stem	
2.	Axon		Passes nerve impulses to muscles, glands, etc.
3.	Spinal Cord		Main conductor
4.	Cerebrum		Center for memory, thought, and speech
5.		Brain	Coordinates and monitors steadiness of muscular movement
6.	Mixed nerve	Spinal cord	

OBJECTIVE: To develop vocabulary related to health and nutrition

DIRECTIONS: Read the paragraph and study the chart below. Then follow the directions for each exercise.

ESSENTIAL NUTRIENTS

Eating the right kinds of food is important for a healthy body. Food needs of the body are supplied by nutrients. The six major nutrients are protein, carbohydrates, fats, vitamins, minerals, and water. (See the chart below.) Nutrients are necessary for heat, energy, and growth. They are also important for tissue building and repair and regulating body processes.

NUTRIENTS	MAIN FUNCTIONS	GOOD SOURCES
Protein	Important for growth and tissue repair; needed for regulating body processes.	Chicken, lean meat, eggs, cheese, milk, soybeans, dry beans, and peanuts
Carbohydrates (starches & sugars)	Necessary for energy and warmth.	Whole-grain bread and cereal, flour, grits, spaghetti, and sugar
Fats	Necessary for energy and warmth; body fat cushions vital organs.	Vegetable oils, margarine, butter, and cream
Vitamins	Important for growth and development of the body; help prevent certain diseases.	Lean meat, seafood, vegetables, fruits, whole-grain cereal, milk, cheese, and yogurt
Minerals	Necessary for strong bones and teeth; needed for regulating certain body processes which affect the blood, nerves, and muscles.	Lean meat, seafood, milk, cheese, fruits, and dark green vegetables
Water	Necessary for all digestive processes; helps dissolve minerals; carries waste out of the body; helps regulate body temperature.	Drinking water, coffee, tea, fruit juices, milk, soup, and some vegetables

A. DIRECTIONS: Complete the following sentences with the correct nutrients.

1. _____ and _____ provide energy and warmth for the body.
2. _____ is important for all processes of digestion.
3. _____ are essential for growth and development of the body. They also help prevent some nutritional diseases.
4. _____ builds and repairs body tissue.
5. _____ is another name for sugars and starches.
6. _____ are especially important for strong bones and teeth.

B. DIRECTIONS: Check (✓) the correct nutrients provided by the foods indicated.

1. Butter and margarine provide

   _____ a. fats _____ b. carbohydrates _____ c. protein

2. Eggs and cheese provide

   _____ a. protein _____ b. fats _____ c. carbohydrates

3. Spaghetti and sugar provide

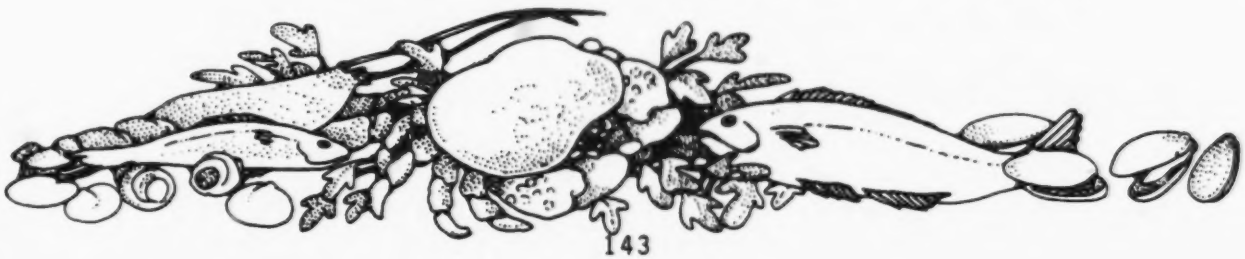
   _____ a. fats _____ b. carbohydrates _____ c. protein

4. Grits and flour provide

   _____ a. protein _____ b. fats _____ c. carbohydrates

5. Vegetable oils provide

   _____ a. protein _____ b. carbohydrates _____ c. fats



OBJECTIVE: To develop vocabulary related to health and nutrition

DIRECTIONS: Read the selection and study the charts. Then follow the directions for each exercise.

ESSENTIAL VITAMINS

Vitamins work with minerals and other nutrients to provide energy for life. However, most of the stored energy in the body comes from carbohydrates and fats. The best source of vitamins is the food we eat. To make sure that the body gets the greatest amount of necessary vitamins, we need to eat a varied diet. We should also avoid overcooking food because overcooking destroys a large percentage of vitamins.

Vitamins are divided into two groups. They may be fat-soluble (see the chart below), such as vitamins A, D, E, and K. The other group is water-soluble (see the chart on page 146). B-complex vitamins (B_1, B_2, B_6, B_{12}, for example) and C are in this group.

VITAMIN	MAIN FUNCTIONS	GOOD SOURCES	DISORDERS CAUSED BY ITS ABSENCE
A	Builds strong bones and teeth; helps keep the skin healthy; helps eyesight.	Whole milk, milk products, liver, eggs, fruit, green and yellow vegetables, cod liver oil	Dry skin, night blindness, common cold, slowness of growth in children, and poorly developed bones and teeth
D	Promotes proper bone and tooth growth along with calcium and phosphorus.	Whole milk, fish, cod liver oil, and direct sunlight	Bowlegs, growth of a long skull, soft bones, malformed chest bones, and poor teeth
E	Helps prevent heart diseases; helps the reproductive system function normally.	Lettuce, wheat germ, eggs, milk, meat, vegetables, vegetable oils, and margarine	Decreases red blood cell resistance to rupture; testicular degeneration; and defective development of the embryo
K	Helps the blood clot properly and the liver function normally.	Green leafy vegetables, egg yolks, cauliflower, and liver	Bleeding problems

A. DIRECTIONS: Match each vitamin on the left with its function on the right.

_____ 1. vitamin A	a. works with calcium to strengthen the bone structure
_____ 2. vitamin D	b. helps keep teeth, skin, and eyes healthy
_____ 3. vitamin E	c. helps to maintain the reproductive system
_____ 4. vitamin K	d. helps the blood clot properly
	e. helps to prevent heart diseases

B. DIRECTIONS: Circle the letter of the best answer to complete each statement.

1. A good source of vitamin D is

   a. orange juice b. skim milk c. sunlight

2. Night blindness can result from a lack of

   a. vitamin B b. vitamin A c. vitamin E

3. Vitamins A and D are especially important for

   a. heart patients b. growing children c. 21-year-olds

4. A male who lacks a sufficient amount of vitamin E may have difficulty

   a. fathering a child b. driving at night c. breathing

5. The best source of vitamins is

   a. pills b. sunlight c. well-prepared food

VITAMIN	MAIN FUNCTIONS	GOOD SOURCES	DISORDERS CAUSED BY ITS ABSENCE
B_1 (thiamin)	Important for healthy nerves; helps prevent fatigue; helps promote digestion.	Yeast, fish, lean meat, milk, whole-grain bread and cereal, and green vegetables	Loss of appetite, constipaton, inflamed nerves, poor digestion, and fatigue
B_2 (riboflavin)	Helps the body grow properly; promotes healthy skin, and tissue repair; helps cells use oxygen.	Milk, lean meat, chicken, fish, eggs, and green vegetables	Watering of the eyes, cracks and sores on the lips, stunted growth, and sore and scaly skin
B_6	Helps maintain healthy skin; helps the cells absorb carbohydrates; important for cell metabolism.	Chicken, liver, tuna fish, yeast, whole-grain bread and cereal, lean meat, and green vegetables	Skin and digestive disorders and mental depression
B_{12}	Helps develop red blood cells properly; aids the nervous system in functioning properly.	Milk, milk products, eggs, lean meat, and liver	Soreness of mouth and tongue, anemia, loss of coordination, and numbness in hands and legs
C (ascorbic acid)	Necessary for strong bones and teeth; helps reduce infections; helps heal wounds.	Oranges, grapefruit, limes, tomatoes, and green leafy vegetables	Loose teeth, sore gums, and infections

C. DIRECTIONS: Match each vitamin on the left with its function on the right.

_____ 1.	vitamin B_1	a. aids in reducing infections and in healing wounds
_____ 2.	vitamin B_6	b. helps develop the red blood cells and maintain the nervous system
_____ 3.	vitamin C	c. helps prevent fatigue and digest food better
_____ 4.	vitamin B_2	d. important for healthy skin and the absorption of carbohydrates by the cells
_____ 5.	vitamin B_{12}	e. aids in tissue repair and the use of oxygen by the cells

D. DIRECTIONS: Fill in the water-soluble vitamin which aids in curing each disorder.

DISORDER	VITAMIN NEEDED
1. loose teeth	_____
2. constipation	_____
3. lip sores and cracks	_____
4. anemia	_____
5. mental depression	_____
6. loss of coordination	_____
7. sore and scaly skin	_____
8. stunted growth	_____
9. infections	_____
10. poor digestion	_____

OBJECTIVE: To develop vocabulary related to health and nutrition

DIRECTIONS: Read the selection and study the chart below. Then complete the exercises which follow.

ESSENTIAL MINERALS

Minerals are inorganic elements that occur in nature. They are important substances in all cells. They help to form the greater portions of the hard parts of the body such as bones and teeth. Minerals are part of the enzyme systems. They play an important role in regulating muscles, nervous tissue, and the amount of blood in the body.

Mineral salts and water are excreted from the body daily. Thus, they must be replaced through the food we eat. The amount of minerals each person needs daily will vary. For example, a growing child or expectant mother will need more minerals than the average normal adult. If the body does not receive enough of certain minerals, health problems can occur. (See the chart below.)

MINERAL	MAIN FUNCTIONS	GOOD SOURCES	DISORDERS CAUSED BY ITS ABSENCE
Calcium	Helps build strong bones and teeth; necessary for proper blood clotting.	Milk and milk products, and dark green vegetables	Poorly developed bones and teeth and bleeding problems
Iodine	Needed for proper functioning of the thyroid gland; helps control the body's rate of physical and mental development.	Iodized table salt and seafood	Enlarged thyroid gland
Iron	Helps build healthy blood; carries oxygen to the cells.	Liver, heart, most lean meats, shellfish, and leafy dark green vegetables	Anemia
Phosphorus	Helps build strong bones and teeth; helps body to store energy from foods.	Dark green leafy vegetables, peanuts, and soybeans	Poorly developed bones and teeth
Potassium	Essential for proper muscle movements; helps the cells to function normally.	Bananas, carrots, pineapples, and whole-grain bread and cereal	Improper growth and functioning of the cells
Sodium	Helps maintain proper water balance.	Table salt and vegetables	Dehydration

A. DIRECTIONS: Complete the following sentences with the proper minerals.

1. _____ and _____ work together to strengthen the bones and teeth.
2. _____ is important for healthy blood.
3. _____ controls the size of the thyroid gland.
4. _____ is important for proper muscle movement.

B. DIRECTIONS: Match each mineral on the left with its food sources on the right.

_____ 1. potassium	a. milk and cheese
_____ 2. phosphorus	b. bananas and pineapples
_____ 3. iodine	c. table salt and seafood
_____ 4. calcium	d. liver and lean meat
_____ 5. iron	e. peanuts and soybeans

C. DIRECTIONS: Write **true** or **false** before each statement.

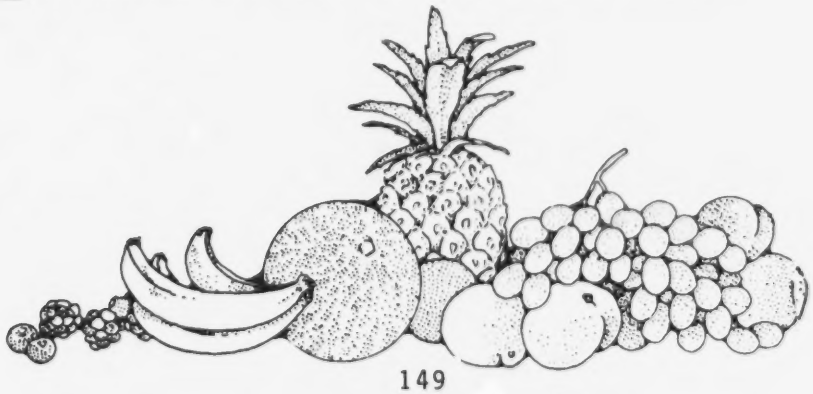
_____ 1. Bananas and carrots are good sources of iron.

_____ 2. Iodine can be found in iodized table salt.

_____ 3. Liver and other red meat can help a person with anemia.

_____ 4. The lack of enough potassium in the body can cause an enlarged thyroid gland.

_____ 5. Calcium is essential for proper blood clotting.



OBJECTIVE: To develop vocabulary related to health

A. DIRECTIONS: Study the meaning of the roots and suffixes below. Then use them to select the best answer in each sentence which follows.

gyne	=	woman	pod	=	foot
hemo	=	blood	opth, opt	=	eye
cian	=	specialist	cardi	=	heart
ologist	=	specialist	neur	=	nerve
iatrist	=	specialist	derm	=	skin
anesthesi	=	loss of sensation	psych	=	mind, behavior
obstetri	=	childbirth			

_____ 1. Does a **hemotologist** specialize in diseases of the eyes or blood?

_____ 2. Does a **cardiologist** specialize in disorders of the heart or mind?

_____ 3. Does a **gynecologist** specialize in diseases common to the reproductive organs of men or women?

_____ 4. Does an **ophthalmologist** specialize in diseases of the feet or eyes?

_____ 5. Does a **dermatologist** specialize in skin ailments or nerve disorders?

_____ 6. Does a **psychologist** analyze the behavior of people or the function of the eyes?

_____ 7. Does a **podiatrist** treat foot ailments or blood disorders?

_____ 8. Does an **anesthesiologist** induce temporary loss of feeling during surgery or does he treat heart diseases?

_____ 9. Does a **neurologist** specialize in disorders of the nervous system or eyes?

_____ 10. Does an **obstetrician** specialize in childbirth or care for older children?

B. DIRECTIONS: Study the words and meanings below. Then write **true** or **false** before each statement which follows. If a statement is false, change it to make it true.

optician	-	a person who makes lenses and eyeglasses.
optometrist	-	a doctor who examines the eyes and prescribes corrective lenses for visual defects.
orthopedist	-	a doctor who specializes in the treatment of deformities and diseases and injuries of the bones and joints.
pediatrician	-	a doctor who specializes in the care of infants and children. He also treats diseases which may affect them.
opthalmologist	-	a doctor who specializes in the structure, function, and diseases of the eyes. He is able to diagnose as well as treat eye diseases.

_____ 1. An optometrist specializes in the treatment of eye diseases.

_____ 2. An ophthalmologist diagnoses and treats diseases of the eyes.

_____ 3. An optician makes eyeglasses.

_____ 4. A doctor who treats pregnant women is a pediatrician.

_____ 5. An orthopedist treats injuries of the bones and joints.

OBJECTIVE: To develop vocabulary related to health and diseases

The following passage discusses three sexually transmitted diseases (STD) or venereal diseases (VD): gonorrhea, syphilis, and herpes. Read to find out:

1. what STD is
2. symptoms of STD
3. body damage caused by STD
4. treatment and cure for STD
5. what to do if you think you have STD

The underlined words are important vocabulary related to STD.

FACTS ABOUT STD

What is STD?

STD is a group of diseases caused by germs passed from person to person. These germs are usually passed during sexual intercourse. They are also passed by close body contact with the sex organs, rectum, or mouth. Contrary to what many people believe, STD is seldom spread through contact with infected objects because the germs die quickly outside the body. For years, the most common kinds of STD have been gonorrhea and syphilis. However, herpes is now becoming widespread.

Gonorrhea

Gonorrhea is commonly called "the clap." Symptoms of the disease usually appear within 2 to 21 days after a person is infected. Early symptoms are an irritation of the sex organs or mouth and painful urination. There may be a sore throat as well as pus from the rectum. There may also be blood in the stool. It is possible that these symptoms will not appear at all in women. For this reason, the disease often goes unnoticed in women.

If gonorrhea is not treated, it can cause serious damage to the body. In men, the disease can injure the penis and prostate gland. In women, it can injure the reproductive organs. If the disease gets into the bloodstream, fever and a skin rash may occur. Heart damage and arthritis may also occur. Gonorrhea can cause blindness, especially in babies. An infected mother does not give it to her unborn child. But, the baby may become infected while passing through the birth canal. To prevent babies from becoming blind from gonorrhea, doctors sometimes drop **silver nitrate** in the babies' eyes soon after they are born.

Gonorrhea can be detected by analyzing germs from tissue samples taken from the sex organs, rectum, or mouth. These germs undergo a special growth process in a laboratory. This special growth of germs is called a **culture**. Gonorrhea can be cured with penicillin. It can also be cured with other **antibiotics** such as tetracycline. But, the damage already caused by the disease will remain.

Syphilis

Syphilis gets into the body through a mucous membrane or break in the skin. But once it's in the body, it can infect any type of tissue.

Usually only the early stages of syphilis are **contagious**. That is, it can be passed on to another person. Within 10 to 90 days after a person is infected, a small painless sore appears on the sex organs, rectum, or mouth. This sore is called a **chancre** (shanker). It disappears within 7 to 28 days, but the germ remains in the body. Weight loss, nervousness, fever, and anemia may accompany the chancre. A rash that looks like chicken pox or hives may also develop.

Syphilis can cause damage to many parts of the body if its germs enter the bloodstream. During its late stages, from 5 to 20 years, it can cause permanent damage to the brain, blood vessels, and spinal cord. It can also cause blindness, insanity, large open sores on the body, and even death. Because syphilis can be passed to an unborn child, a woman should be examined for it before she conceives. In Illinois, a blood test to detect syphilis is required before a marriage license is issued.

Syphilis can be treated and cured with penicillin and tetracycline. But, they cannot repair the damage that the disease has already caused.

Herpes

Herpes is caused by the herpes simplex virus (HSV). There are two common types of HSV. **Type I, labial herpes**, affects the mouth (and the area around it) in the form of cold sores. It is contagious but not a venereal disease. **Type II, genital herpes**, affects the sex organs and is a venereal disease.

The first sign of herpes is an itch that turns into a blister. The blister may appear 2 to 20 days after a person is infected. The blister turns into a sore. The sore may last for weeks, then heal completely. Painful urination may accompany the sore. Other symptoms are swollen glands, muscle aches, headache, fever, and a discharge from the sex organs. Although the symptoms may disappear, herpes is still in the body. Herpes can enter the nerve cells and stay there without causing any noticeable damage. However, there is no way of knowing how long this virus will remain in **remission**, i.e., inactive.

Herpes can be especially damaging to newborn babies. The newborn can become infected with the virus during birth. He may also contract herpes after birth by having close contact with someone who has active labial herpes. Doctors say that about 50 percent of infants exposed to active herpes during birth die from it. The survivors usually have brain damage. For this reason, most doctors suggest that pregnant mothers with active herpes undergo a **Caesarean section**. This type of surgery involves a baby being delivered through an incision in the walls of the abdomen and uterus.

Herpes can be detected by analyzing cultures of germs taken from sample tissue from the sex organs, rectum, or mouth. Since there is no known cure for herpes, its victims rely on various kinds of treatment. Counseling and cleanliness are important. Bathing with epsom salts may speed the healing of sores caused by the disease. Some pills and ointments are also used for treatment. However, most of them have not been approved by the Food and Drug Administration.

A Final Note on STD

If a person is sexually active, there are certain things he can do to reduce his chances of getting or spreading STD. First, he should get regular STD exams. He should also reduce the number of sexual contacts. A man should use a condom. But once infected, he should avoid oral and sexual contact. It is also very important that the infected area be kept washed with soap and water.

It is important to know that a person can have symptoms similar to those of STD and yet not have it. However, if a person thinks that he has STD, he should contact his doctor. He can also contact the Board of Health. Either of them will give him the proper test. The results of the test will remain confidential. If the test results show that the person does have STD, treatment should begin immediately. He should also contact his sexual partner so that that person can be tested and treated if necessary.

A. DIRECTIONS: Use the words below to complete the following sentences. The words (or a form of the words) were introduced in the reading selection.

chancre	**Caesarean section**	**silver nitrate**	**contagious**	**cultures**
herpes	**STD**	**remission**	**syphilis**	**antibiotics**

1. Doctors use _____ in the eyes of newborns. The solution helps to guard against blindness.
2. _____ is a group of diseases transmitted by sexual intercourse or close body contact with the mouth, rectum, or sex organs of an infected person.
3. Doctors recommend a _____ for pregnant women with active herpes.
4. A _____ is usually the first sign of syphilis. This painless sore appears within 10 to 90 days after a person is infected.
5. _____ such as penicillin and tetracycline are used to treat and cure some STDs.
6. Inactive herpes has gone into _____ .
7. Gonorrhea can be diagnosed by analyzing _____ of tissue samples taken from the sex organs, rectum, or mouth.
8. _____ can be detected by taking a blood test.
9. _____ is one form of STD which cannot be cured.
10. If a disease is _____, it can be passed from one person to another.

B. DIRECTION: Answer the following questions.

1. What parts of the body can be affected by genital herpes?

_____

2. Why is it unusual for a person to get STD from an infected object?

_____

3. What damage can gonorrhea cause to the body if the disease is not treated properly?

_____

4. How can a newborn baby get herpes from his infected mother?

_____

5. What form of labial herpes is very common?

_____

6. What risks are involved in a baby being exposed to active herpes during delivery?

_____

7. How should a herpes victim care for himself?

_____

8. How serious is syphilis during its late stages?

_____

9. What advice about STD would you give to a person who is sexually active?

_____

10. Who should you contact if you think you have STD?

_____

OBJECTIVE: To make a generalization from a reading selection

A generalization is a summary of a group of facts. Making a generalization is like summarizing the main idea or drawing a conclusion.

A. DIRECTIONS: Read each group of facts. Then circle the letter of the best generalization.

Facts

1. A tablespoon of honey has 18 more calories than a tablespooon of refined table sugar.
2. Honey rots teeth faster than refined table sugar.
3. Raw honey sometimes contains hazardous substances such as botulin spores that cause acute food poisoning.

1. What generalization can you make about the nutritional value of honey as compared to the nutritional value of refined table sugar?

   a. Contrary to popular belief, honey is no healthier than refined table sugar.

   b. Honey sold at health-food stores is better than honey sold at supermarkets.

   c. Refined table sugar tastes better than honey.

   d. All brands of honey are better than all brands of table sugar.

Facts

1. Smoking and taking the birth control pill increase the risk of heart attacks and strokes.
2. Women who smoke and take the pill are ten times more likely to suffer heart attacks than those who do not smoke or take the pill.
3. Smoking during pregnancy increases the risk of miscarriage and stillbirth.
4. Prematurity, birth defects, and lower birth weights are found among infants of mothers who smoke.

2. What generalization can you make about smoking and women who take the birth control pill and pregnant women?

   a. Smoking is more damaging to men than it is to women.

   b. More women die from heart attacks than from strokes.

   c. All pregnant women who smoke will have premature babies.

   d. Cigarette smoking is a major threat to pregnant women and women who take the birth control pill.

Facts

1. In hot weather, porous fabrics allow perspiration to evaporate.
2. Porous fabrics absorb excess moisture in hot weather.
3. Cotton allows perspiration to evaporate.
4. Many synthetic fabrics are nonporous and hold in heat and perspiration.

3. What generalization can you make about the suitability of cotton and synthetic fabrics during hot weather?

   a. Cold weather is more comfortable than hot weather.

   b. Cotton is more comfortable than synthetic fabric during hot weather.

   c. Most polyester fabrics are porous.

   d. All synthetic fabrics absorb excess moisture.

Facts

1. Nylon bristles can break your hair.
2. Sharp nylon bristles can irritate your scalp.
3. Natural bristles are textured to absorb and spread the natural hair oils.
4. You condition your hair each time you brush it with natural hair bristles.

4. What generalization can you make about hair brushes with natural bristles and those with nylon bristles?

   a. Nylon bristles are better for your hair than natural bristles.

   b. Natural bristles are better for your hair than nylon bristles.

   c. All natural bristles irritate the scalp.

   d. Nylon bristles absorb natural hair oils.

B. DIRECTIONS: Make a generalization after reading the facts in each selection which follows. The first generalization has been written for you.

1. In 1964, President Lyndon Johnson appointed a National Commission on Food and Marketing. It did several studies on the food industry. Among them was a study done on the cost of cereal. The Commission reported that for every dollar that we spend for breakfast cereal, we get only 10 cents worth of grain. The additives, minerals, vitamins, and protein fortifiers in this cereal only cost 6 cents. The Commission found that 12 cents goes into packaging. It also found that 17 cents goes into advertising and the manufacturer's profit. The remaining 55 cents goes for processing, wholesaling, retailing, and transporting the cereal.

   What generalization can you make about the money we spent on breakfast cereal in 1964?

   Most of the money we spend on cereal goes for things other than grain.

2. Many beverages contain acids strong enough to damage the tooth enamel. Some exceptions are water and milk. Carbonated sodas as well as natural fruit drinks have high levels of strong acids. Tooth enamel, the hardest substance in the human body, can withstand almost any other substance except strong acids. Often these acids are caused by bacteria which survive on sugars that stick to the teeth. These sugars are usually the main cause of tooth decay.

What generalization can you make about the effect that strong acids have upon tooth enamel?

_____

_____

3. AIDS stands for Acquired Immune Deficiency Syndrome. This disease affects the body's ability to defend itself against other diseases. The cause and cure of AIDS are unknown.

In July, 1983, medical experts reported that the number of AIDS victims was nearly 2,000. Active male homosexuals and bisexuals made up about 75% of this figure. Intravenous drug users made up about 17% of the victims. Hemophiliacs, persons who have problems with blood clotting, were 1% of the victims. There were also other cases of AIDS during this same period. About 10 cases developed through blood transfusions. Twenty-one children had the disease. There were also 109 cases of AIDS reported among women.

What generalization can you make about victims of AIDS during July, 1983?

_____

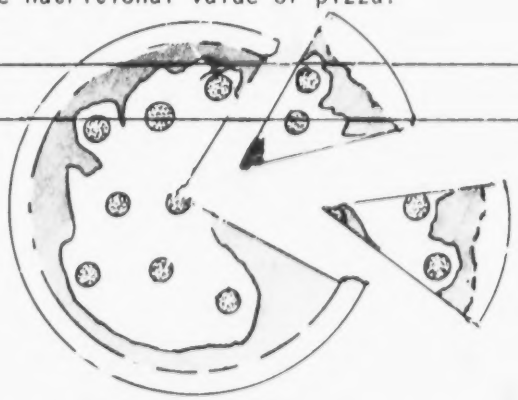
_____

4. Contrary to popular belief, pizza is not a junk food. Let's examine the contents of a deluxe sausage pizza. It is made of dough, cheese, green peppers, and onions. It also contains mushrooms, tomato sauce, and sausage. Notice that this pizza has an ingredient from each of the four basic food groups. The dough belongs to the Bread and Cereal Group. The cheese is part of the Milk Product Group. The onions, mushroom, and tomatoes are from the Fruit and Vegetable Group. The sausage is from the Meat Group. Now you can see why pizza may be eaten as a main dish or as a nutritious snack.

What generalization can you make about the nutritional value of pizza?

_____

_____



5. Diabetes is a disease in which too much glucose is in the blood and urine. If it is not treated properly, it can lead to various problems in the body such as hemmoraging of the eyes and blindness.

Diabetics can get relief through insulin injections. They can also relieve symptoms by following a diet that is low in carbohydrates, primarily sugar. For this reason, many people believe that diabetes is mainly caused by eating too much sugar. Some medical experts believe that the intake of too much sugar can cause diabetes. But the overall opinion of doctors is that the cause of the disease are unknown. However, heredity and obesity have been linked to the disease.

What generalization can you make about the cause of diabetes?

_____

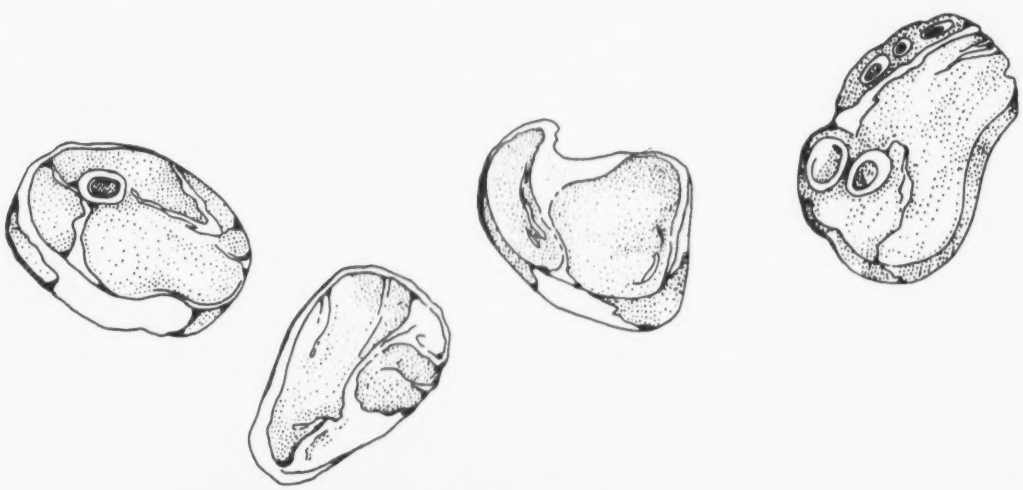
_____

6. An important guide to buying meat is understanding its grade system. The purpose of this system is to determine the tenderness, juiciness, and flavor for frying or oven cooking. There are basically five grades of meats. The top grade, **prime**, is tastier, juicier, and more tender than any other grade. It is mainly sold to expensive restaurants. The second-best grade of meat is **choice**. It is the most popular grade in supermarkets. Third on the list is **good**. These three grades are ideal for frying or oven cooking. However, two additional grades, **standard** and **commercial**, taste better when they are boiled or tenderized.

What generalization can you make about the grading of meat?

_____

_____

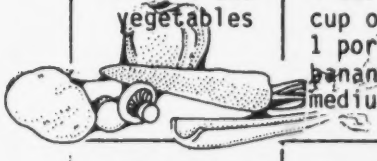
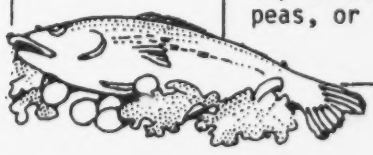


OBJECTIVE: To interpret information from tables

FOUR BASIC FOOD GROUPS

Study the table below to find out:

1. the names of the four basic food groups
2. the U.S. Recommended Daily Allowance (RDA) of food from each group
3. the nutrients commonly found in each group
4. food from which to obtain necessary nutrients

GROUP	RECOMMENDED DAILY ALLOWANCES	NUTRIENTS	GOOD SOURCES
Dairy Products	Milk servings (8 fluid oz.) Children: 2-3 Teenagers: 4 Adults: 2 Nursing mothers: 4 Milk products may replace part of the fluid milk. 1/2 cup yogurt or 1-inch cube Cheddar-type cheese = 1/2 cup milk; 1/2 cup cottage cheese or ice cream = 1/3 cup milk.	Protein Minerals Vitamins Fats	Whole, skim, or evaporated milk, buttermilk, butter, Cheddar-type cheese, cottage cheese, yogurt, ice cream
Bread and Cereal	4 servings (1 serving = 1 slice of bread; 1 oz. instant cereal; or 1/2 cup of cooked cereal.)	Carbohydrates Vitamins Minerals	Whole-grain or enriched bread, grits, rice, macaroni, spaghetti, noodles
Fruits and vegetables 	4 servings (1 serving = 1/2 cup of vegetables or fruit; 1 portion such as 1 medium banana or potato; or 1/2 medium grapefruit.)	Carbohydrates Vitamins Minerals	Oranges, lemons, tomatoes, peppers, dark green or yellow vegetables
Meat, Fish, and Poultry 	Two servings (1 serving = 2-3 oz., also 1 egg or 1/2 cup cooked or dry beans, peas, or lentils.)	Protein Vitamins Minerals Fats	Beef, veal, lamb, pork, liver, fish, poultry, eggs, peanuts, peas, beans, lentils

DIRECTIONS: Circle the letter of the best answer to complete a statement or answer a question.

1. Two 1-inch cubes of Cheddar-type cheese has the same nutritional value as

   a. a gallon of ice cream.

   b. an 8-ounce cup of skim milk.

   c. a quart of whole milk.

   d. 1/4 cup of cottage cheese.

2. The RDA of fluid milk for teenagers is the same as the RDA of fluid milk for

   a. adults.

   b. children.

   c. pregnant mothers.

   d. nursing mothers.

3. What food group does a boiled egg belong to?

   a. Dairy Products

   b. Bread and Cereal

   c. Fruits and Vegetables

   d. Meat, Fish, and Poultry

4. Four slices of whole-grain bread has the same nutritional value as

   a. two cups of cooked noodles.

   b. a half cup of yogurt.

   c. an ounce of instant grits.

   d. all of the above

5. Which food has about the same nutritional value as a 5-ounce T-bone steak?

   a. two scrambled eggs

   b. a cup of pinto beans

   c. a half cup of green peas and a half cup of lentils

   d. all of the above

OBJECTIVE: To interpret information from tables

This exercise discusses calories and body weight. Read to find out:

1. how energy is measured
2. where food energy comes from
3. how calories affect body weight
4. your daily calorie need
5. the desirable body weights for adults
6. factors which determine your caloric need

CALORIE: THE ENERGY UNIT

PART I

Where Food Energy Comes From

The energy we get from food enables the body to perform all of its functions. This energy is measured in units called **calories**. Foods high in carbohydrates and fats supply the body with most of its energy. Foods such as tomatoes, oranges, and watermelon, which contain large amounts of water, do not supply the body with very much energy because water has no calories.

How Calories Affect Body Weight

Calories play a major role in body weight. If you consume more calories than your body needs, the excess calories are stored in the body as fat. Over a period of time you will gain weight. On the other hand, if you consume fewer calories than your body needs, you will lose weight. Watch your calorie intake carefully because the intake of too few or too many calories may affect your health.

Your Daily Caloric Need

Most adults of average activity need from 16 to 18 calories per pound to maintain their desired weight. To figure out your daily calorie need, pick the midpoint of your weight range. (See the weight tables on the next page.) Multiply this figure by 18 if you are a man, and by 16 if you are woman.

EXAMPLE:

The desirable weight for a man 5 feet 7 inches tall of average body build is about 140 pounds. If his activity is average, he will use about (18 x 140) 2,520 calories a day.

DESIRABLE WEIGHTS FOR ADULTS*

Men (age 25 and over)

	Small Frame	Medium Frame	Large Frame
5'2"	112-120	118-129	126-141
5'3"	115-123	121-133	129-144
5'4"	118-126	124-136	132-148
5'5	121-129	127-139	135-152
5'6"	124-133	130-143	138-156
5'7"	128-137	134-147	142-161
5'8"	132-141	138-152	147-166
5'9"	136-145	142-156	151-170
5'10"	140-150	146-160	155-174
5'11"	144-154	150-165	159-195
6'0"	148-158	154-170	164-184
6'1"	152-162	158-175	168-189
6'2"	156-167	162-180	173-194
6'3"	160-171	167-185	178-199
6'4"	164-175	172-190	182-204

Women (age 25 and over)

	Small Frame	Medium Frame	Large Frame
4'10"	92-98	96-107	104-119
4'11"	94-101	98-110	106-122
5'0"	96-104	101-113	109-125
5'1"	99-107	104-116	112-128
5'2"	102-110	107-119	115-131
5'3"	105-113	110-122	118-134
5'4"	108-116	113-126	121-138
5'5"	111-119	116-130	125-142
5'6"	114-123	120-135	129-146
5'7"	118-127	124-139	133-150
5'8"	122-131	128-143	137-154
5'9"	126-135	132-147	141-158
5'10"	130-140	136-151	145-163
5'11"	134-144	140-155	149-168
6'0"	138-148	144-159	153-173

*These weight tables are standard ones used by major insurance companies.

A. DIRECTIONS: Write **T** if the statement is **true** and **F** if it is **false.**

_____ 1. Excess calories form fat in the body.

_____ 2. Foods with a lot of water supply the body with most of its energy.

_____ 3. Foods such as butter and vegetable oils supply the body with very little energy.

_____ 4. If you reduce your caloric intake, you will lose weight.

_____ 5. The average body weight for a 28-year-old man 6 feet tall with a small frame is about the same as that of a woman of the same age, height, and frame.

_____ 6. The desirable weight for a 31-year-old man 5 feet 4 inches tall with a small frame is about the same as that of a woman 5 feet 7 inches tall with a small frame.

_____ 7. A man who is 6 feet tall with a small frame and who weighs 184 pounds is probably overweight.

_____ 8. The daily calorie requirement for a 25-year-old woman who is 5 feet tall, has a small frame, and weighs 100 pounds is 2,600.

_____ 9. The daily calorie requirement for a 30-year-old man 5 feet ten inches tall with a large body build is 1,152.

_____10. Desirable weight is determined by height, sex, age, and body build.

B. DIRECTIONS: Estimate the number of calories needed daily for the person below to maintain her present weight.

GENERAL INFORMATION

- 5'6" female
- 130 pounds in weight
- medium frame
- a typist

number of calories needed daily _____

C. DIRECTIONS: Estimate the number of calories you need daily to maintain your desired weight. (Fill in the general information).

GENERAL INFORMATION

sex: _____

weight: _____

height: _____

frame: _____

number of calories needed daily _____

PART II

Things That Affect Calorie Requirement

The number of calories or food energy needed will vary from person to person. The number of calories a person needs depends on his activity, age, height, weight, sex, health condition, and temperature of the air.

A construction worker needs more calories than a clerk. Children need more calories than most adults. Large people need more calories than small people. A man requires more calories than a woman. The body requires more calories in cold weather than in warm weather. A person recovering from an illness needs more calories than when he is in good health.

Although the amount of energy the body needs varies from person to person, you can be sure that your intake of nutrients and calories play a significant part in your well-being.

A. DIRECTIONS: Write T if the statement is **true** and F if it is **false.**

_____ 1. A 140-pound swimmer needs fewer calories than a 140-pound writer.

_____ 2. A 12-year-old boy usually needs more calories than a 55-year-old man.

_____ 3. A 200-pound carpenter needs fewer calories than a 150-pound typist.

_____ 4. All 30-year-old women require the same number of calories.

_____ 5. The body needs more calories in the winter than in the summer.

_____ 6. A 180-pound construction worker needs more calories than a 120-pound singer.

_____ 7. A person recovering from an illness needs more calories than when he is in good health.

_____ 8. A 5'9", 150-pound boxer needs more calories than a 5'9", 150-pound clerk.

_____ 9. Children and adults require the same number of calories.

_____10. A bus driver needs fewer calories than a professional swimmer.

B. DIRECTIONS: Study the table below. It gives an indication of the approximate number of calories used by the average person during certain activities. These figures may vary based on a person's metabolic rate (the rate at which the body uses calories), age, sex, and body composition.

Calories for Activities*

Activity	Calories Used Per Hour
I. Rest and Light Activity	**50 - 200**
Reading	40
Watching television	40
Sewing	50
Sleeping	80
Rapid typing	100
Walking slowly	120
Driving a car	120
Golfing	150
Domestic work (dusting, making beds, sweeping, ironing)	150-180
II. Moderate Activity	**200 - 350**
Gardening	200
Bicycling (5 1/2 mph)	210
Domestic work (heavy scrubbing and washing)	250
Walking quickly	250
Lawn mowing (power mower)	300
Lawn mowing (hand mower)	350
Bowling (1/4 mph)	350
Roller skating	350
III. Vigorous Activity	**Over - 350**
Table tennis	360
Sawing	400
Tennis	420
Skiing (10 mph)	600
Swimming (1/2 mph)	600
Running (10 mph)	900

*This energy expenditure table was adapted from tables prepared by Dr. Robert E. Johnson and colleagues, University of Illinois (1967); Dr. Michael H. K. Irvin, Public Affairs Committee (1973); and the U.S. Department of Agriculture (1973).

C. **DIRECTIONS:** Write **true** or **false** before each statement. Use the table in B on the previous page.

_____ 1. We use more calories sleeping than we use golfing.

_____ 2. We use approximately 120 calories when we drive a car.

_____ 3. More calories are used during heavy scrubbing than during sawing.

_____ 4. We use approximately 10 calories while watching TV for two hours.

_____ 5. Bowling and roller skating cause us to expend the same number of calories.

_____ 6. More calories are used during swimming than during sewing.

_____ 7. Reading is a restful activity.

_____ 8. If you drive a car for eight hours, you will use approximately 960 calories.

_____ 9. Walking quickly for two hours will expend about 500 calories.

_____ 10. Bicycling at 5 miles per hour is more strenuous than running at 10 miles per hour.

OBJECTIVE: To interpret information from tables

This exercise discusses caffeine and its sources. Read to find out:

1. symptoms of caffeine addiction
2. the length of time it takes to become addicted to caffeine
3. how to break caffeine addiction
4. about some beverages, food, and drugs that contain caffeine

ARE YOU ADDICTED TO CAFFEINE?

Do you depend upon coffee to get you through the day? Does drinking certain sodas change the way you feel and act? Do you depend upon diet pills to lose weight? Do you drink at least four or five cups of caffeinated coffee a day? If your answer is "yes" to any one of these questions, you may be addicted to caffeine. Caffeine addicts may have difficulty sleeping and breathing. They may also have headaches, nervousness, and anxiety. Sometimes caffeine addicts suffer from depression and fast heartbeats. Other symptoms include diarrhea, stomach pains, and heartburn.

Caffeine addiction does not happen overnight. It develops over a period of time. If you think you are addicted to caffeine, try this test. Stop drinking coffee (or some other beverage with caffeine) for a few days. You should soon have withdrawal symptoms. The first symptom will probably be a headache. Then you may get drowsy, depressed, or experience nausea. These symptoms may last for 14 days or a little longer. You may also experience these same effects if you withdraw from other sources of caffeine such as prescription and nonprescription drugs.

Breaking the caffeine addiction should be done gradually. Begin by reducing your intake a little more each day. If you normally drink caffeinated coffee early in the morning, substitute it with exercise. Increase your caffeine awareness. Make sure that all of the beverages that you drink are caffeine-free. Also, before you buy a beverage or drug, read the label for its caffeine content. If you follow these suggestions, your battle with caffeine will be a thing of the past.

A. DIRECTIONS: Circle the letter of the correct answer to answer a question or complete a statement.

1. Which of the following is **not** a sign of caffeine addiction?

   a. nervousness
   b. headaches
   c. cold sores
   d. drowsiness

2. Withdrawal symptoms for caffeine addicts last approximately

   a. fourteen hours
   b. three days
   c. two weeks
   d. one year

3. Caffeine addiction can develop from

   a. prescription drugs
   b. nonprescription drugs
   c. coffee
   d. all of the above

4. Which of the following should you **not** do if you want to break your addiction to caffeinated coffee?

   a. Increase your caffeine awareness.
   b. Substitute a cup of caffeinated coffee with two cups of caffeinated tea.
   c. Exercise instead of drinking caffeinated coffee.
   d. none of the above

5. Which of the following statements is **true**?

   a. Caffeine addiction happens gradually.
   b. Caffeine has a strong effect on the way a person acts and feels.
   c. Some soft drinks or sodas contain caffeine.
   d. all of the above

B. DIRECTIONS: Study the table below and complete the exercise which follows it.

CAFFEINE

SOURCE	MILLIGRAMS
BEVERAGES	
Coffee (5 ounces)	
Drip method	146
Percolated	110
Instant regular	53
Decaffeinated	2
Tea (5 ounces) (Loose or in tea bags)	
One-minute brew	9 to 33
Three-minute brew	20 to 46
Ice-tea, cans (12 oz.)	22 to 36
Soda (12-ounce cans)	
Mountain Dew	52
Tab	44
Dr. Pepper	38
Diet Dr. Pepper	37
Royal Crown Cola	36
Diet Rite Cola	34
Diet Pepsi	34
7-Up	0
Diet 7-Up	0
Sprite	0
Hires Root Beer	0
BEVERAGES AND FOOD	
Cocoa and Chocolate	
Cocoa (made from mix) (6 oz.)	10
Milk chocolate (1 oz.)	6
Baking chocolate (1 oz.)	35

SOURCE	MILLIGRAMS
NONPRESCRIPTION DRUGS (STANDARD DOSES)	
Stimulants	
Caffedrine Capsules	200
No-Doz Tablets	200
Pain relievers	
Anacin	64
Excedrin	130
Plain aspirin	0
Tylenol	0
Diuretics	
Aqua-Ban	200
Pre-Mens Forte	100
Cold remedies	
Dristan	30
Triaminicin	30
Weight-control aids	
Dexatrim	200
Dietac	200

Source: Adapted from a table in Consumer Reports, October, 1981.

1. Which sodas have over 40 milligrams of caffeine?

_____

2. Which nonprescription drugs have 200 milligrams of caffeine?

_____

3. Which coffee has more caffeine, instant regular, or percolated?

_____

4. Does a 12-ounce can of ice-tea contain more caffeine than a 12-ounce can of 7-Up?

_____ _____

5. Which pain relievers contain no caffeine?

_____

6. Which sodas contain no caffeine?

_____

7. Does cocoa or baking chocolate have a higher caffeine content?

_____

8. If a caffeine addict is trying to "kick the habit," is it okay for him to drink 7-Up?

_____

9. What items have the highest caffeine content?

_____

10. Which has more caffeine, one ounce of milk chocolate, or one ounce of baking chocolate?

_____

OBJECTIVE: To draw a conclusion from a reading selection

To **draw a conclusion** is to make a judgement or determine the outcome of something based on the information given.

Read the paragraph below and see if you can draw a logical conclusion.

> As the baby played in his crib, he seemed to enjoy the attention he was getting from his family. When his mother walked by and waved, the baby waved back. When his sister touched his hands and smiled several times, the baby smiled back. When the baby's father approached the crib and talked to him, the baby attempted to talk back.

Conclusion: Babies will imitate the gestures and sounds of others.

DIRECTIONS: Circle the letter of the **best** conclusion for each of the following paragraphs.

1. After eating a meal high in sugar, you will usually get a quick surge of energy. However, after eating a meal rich in protein, your energy level will increase gradually and last for several hours after you have eaten.

   a. The kind of food you eat affects your level of energy.

   b. A high-protein meal gives a quick burst of energy.

   c. A meal high in sugar gradually increases the level of body energy.

   d. What you eat does not affect how you feel.

2. Although leftovers may save time, they can have a loss in nutritional value. For example, cooked vegetables lose approximately one-fourth of their vitamin C if they are allowed to stay in the refrigerator for one day. After about two days in the refrigerator, leftovers lose about one-third of their vitamin C.

   a. The longer vegetables are refrigerated, the better they taste.

   b. The longer cooked vegetables stay in the refrigerator, the less food value they have.

   c. All vegetables contain vitamin C.

   d. all of the above

3. Although Mrs. Turner was exhausted, she decided to prepare dinner for her family anyway. She put a pot of peas on the stove and a roast in the oven. While her food was cooking, she thought that she would relax for a few minutes. However, she hadn't planned on going to sleep. About three hours later, the smoke alarm went off. Mrs. Turner jumped out of bed and ran to the kitchen yelling "Oh, no! Not again!"

   a. Mrs. Turner had worked a double shift.

   b. Mrs. Turner didn't put enough water in her peas.

   c. Mrs. Turner has burned food before because she fell asleep while it was cooking.

   d. none of the above

4. The main cause of overweight is an intake of too many calories. However, overweight is often blamed on glandular disorders, heredity, and body build. Overweight caused by endocrine gland disorders is very rare. According to medical authorities about one or two out of every 100 overweight persons have a true metabolic problem related to weight. Also, overweight that is common in a particular family is probably due to poor eating habits rather than heredity. Children usually imitate their parents' eating habits, and once a pattern of overeating is established in a family, it tends to be passed on to the next generation.

   a. Overweight is hereditary.

   b. Overweight caused by glandular problems is quite common.

   c. Overweight in most people is due to overeating.

   d. Children usually don't imitate the eating habits of their parents.

5. The pituitary gland sends out various hormones which control many vital activities of the body. One such hormone is the growth hormone. If the pituitary gland produces the right amount of the growth hormone, a person will grow to his normal size. If not enough of this hormone is produced, a person will be a midget. A midget is usually about two to four feet shorter than normal. If too much of the growth hormone is produced, a person can grow to be a giant. A person is considered a giant if he is about two to four feet taller than normal.

   a. A midget's pituitary gland produces too much of the growth hormone.

   b. A person's height is determined mostly by the amount of the growth hormone produced by the pituitary gland.

   c. Most people have severe problems with their pituitary gland.

   d. all the above

803, Exercise 2

OBJECTIVE: To understand test-taking techniques

The passage below discusses three kinds of employment tests: interest inventories, aptitude tests, and proficiency tests. Read to find out:

1. why employers and employment counselors give these tests
2. what various employment tests measure
3. why the Army used proficiency tests in World War I

EMPLOYMENT TESTS

Employers and employment counselors give special kinds of tests to find out your interests and skills. Most of these tests fall into three groups. They are interest inventories and aptitude and proficiency tests.

Interest inventories can help you decide the kind of work you are suited for. They tell you if you prefer to work with your hands, ideas, or people. Because there are no right or wrong answers, you cannot fail an interest inventory.

Aptitude tests measure your potential in an area. They can measure your ability in mathematics, reading comprehension, and grammar and usage. They can also measure your ability to perform such duties as mechanical or clerical work. There are two basic kinds of aptitude tests. The written test is sometimes called a "paper and pencil" test. A performance test requires you to perform tasks.

Proficiency tests can measure your readiness for a certain job or career. They were first used by the Army in World War I to measure the recruits' technical knowledge.

Although employers and counselors use employment tests for job placement, most agree that the human element is important, too. Many also agree that no one set of test results is completely reliable. However, since employment testing is probably here to stay, do your best on any employment test that you take.

DIRECTIONS: The items that follow are examples of types of questions which may appear on basic employment tests. Underline the **best** answer in each question.

1. **Work** is to **worker** as **employ** is to

   a. supervisor b. working c. employer d. employee

2. **Fail** is to **succeed** as **disappoint** is to

   a. content b. achieve c. satisfy d. agitate

3. A bus pass costs $40.00 for one month. What will it cost for six months?

   a. $240.00 b. $180.00 c. $260.00 d. $150.00

4. The shortest month of the year is

   a. January b. March c. February d. December

5. The opposite of **difficult** is

   a. simple b. involved c. effective d. complicated

6. Which word does not belong?

   a. water b. snow c. ice d. sand

7. Which names are alike?

   a. M. T. Green, M. T. Greene
   b. A. Thurslonberg, A. Thrustonburg
   b. Roberto Clemente, Roberto Climente
   d. D. Stein, D. Stein

8. Which pair of these items are alike?

   a. 4289, 4829 b. 0882, 0882 c. 37236, 27326 d. 111511, 151115

9. Which fraction represents the largest amount?

   a. 1/8 b. 1/4 c. 1/16 d. 1/2

10. **Six** is to a dozen as **one-half** is to

    a. a whole b. two-thirds c. two d. fifty

11. Which word does not belong?

    a. newspaper b. magazine c. comic book d. radio

12. **Stationary** is to **stationery** as **alter** is to

a. church b. altar c. write d. envelope

13. The opposite of **temporary** is

a. common b. annual c. permanent d. part-time

14. **Rug** is to **floor** as **hat** is to

a. cap b. carpet c. cover d. head

15. **Fight** is to **battle** as **final** is to:

a. beginning b. end c. middle d. war

16. The coldest season of the year is

a. fall b. winter c. spring d. summer

17. 1, 2, 3 is to 10, 11, 12 as 3, 6, 9, is to:

a. 18, 20, 22 b. 30, 33, 36 c. 6, 7, 8 d. 4, 2, 8

18. What fraction represents the smallest amount?

a. 1/4 b. 1/2 c. 3/4 d. 7/8

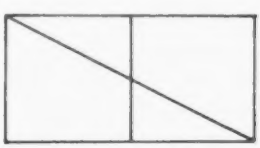
19. Which names are alike?

a. Ethel, Erthel
b. Thad, Thadd
c. Dorothy, Dorothy
d. Douglass, Douglas

20. What figure on the right is most nearly like the one on the left?

____ a.

____ b.

____ c. 

____ d.

OBJECTIVE: To understand test-taking techniques

The following passage discusses the history of GED (General Educational Development). Read to find out:

1. when the GED Testing Program was started
2. the original purpose of the program
3. how civilians got involved in the program
4. what the GED Test measures
5. why adults take the GED Test

THE HISTORY OF GED

The GED Testing Program was started in World War II. Its original name was the Veterans Testing Service (VTS) Program. Its main purpose was to help veterans resume their educational and vocational plans.

The program was later opened to civilians. As a result, the American Council on Education formed a group to oversee it. This group was called the Commission on Accreditation of Service Experience. By 1959 the number of civilians in the program was more than the number of veterans in it. For this reason, in 1963, the name was changed to General Educational Development (GED) Testing Service.

The GED is widely accepted as a valid way of measuring high school graduation equivalency. It measures skills and knowledge in five subject areas. These areas are reading, writing, social studies, science, and mathematics. The test is also written in English, Spanish, and French.

Adults take the GED Test for various reasons. Some want to qualify for certain jobs. Others want to get promoted on their present jobs. Still others want to attend college. Many may also take the test for personal satisfaction.

You are just a few steps away from the GED Test. Can you pass it? If you study hard and apply yourself, YES, YOU CAN!

DIRECTIONS: Check the **best** answer to complete a statement or answer a question.

1. The GED Test was originally designed for

   a. veterans of the service who wanted to obtain a certificate equal to a high school diploma.
   b. civilians who wanted to complete high school.
   c. anyone who wanted to enter the Army.
   d. only navymen who wanted to complete high school.

2. The original name of the GED Testing Service was

   a. Civilian Testing Service (CTS).
   b. Armed Forces Testing Program (AFTP).
   c. Veterans Testing Service (VTS).
   d. Veterans and Civilians Testing Service (VCTS).

3. The organization which formed a group to manage the GED Testing Program was

    a. The GED Council for the United States.
    b. The American College Testing Program.
    c. The American Council on Education.
    d. The National Council on High School Completion.

4. Which statement is **true** about the GED Test?

    a. It is written in English only.
    b. It is never given to people over 65 years old.
    c. It is widely accepted as an indicator of high school equivalency.
    d. The National Council on High School Completion designed it.

5. The five subject areas for the GED Test are

    a. mathematics, writing, social studies, art, and science.
    b. Spanish, writing, reading, speaking, and mathematics.
    c. writing, reading, science, mathematics, and Spanish.
    d. mathematics, reading, science, writing, and social studies.

6. The GED was first used during

    a. the Vietnam War.
    b. World War II.
    c. the Korean War.
    d. World War I.

7. People take the GED Test

    a. for high school completion equivalency.
    b. for personal satisfaction.
    c. for job promotion.
    d. c and a above
    e. all of the above

8. The VTS was changed to GED because

    a. veterans no longer wanted to take the test.
    b. the number of veterans taking the test was more than the number of civilians taking it.
    c. the number of civilians taking the test was more than the number of veterans taking it.
    d. too many veterans were taking the test.

9. The GED Test is written in

    a. Spanish, German, and English.
    b. French, German, and English.
    c. English, French, and Spanish.
    d. Spanish, Polish, and English.

10. GED is an abbreviation for

a. General Education Division.
b. General Educational Development.
c. General Elementary Development.
d. General Elementary Division.

OBJECTIVE: To understand test-taking techniques

The following selection gives tips which can be applied to the GED Test as well as other tests. Read to find out:

1. how the GED Test is scored
2. strategies for answering questions
3. the format of test answers
4. why some students fail the GED Test

HINTS FOR TAKING THE GED TEST

* The GED Test is scored by the number of right answers. A guess has at least a chance of being right. An unmarked answer is always wrong. **No question should be left unanswered.** If you come to a question whose answer you do not know skip it. Go to an easier question. Then return to the harder questions later.

* Before you answer a question, read all of the posssible answers. The last answer may be a little **more** correct than the ones before.

* All of the answers on the GED Test are multiple choice. As you go over the four or five choices, eliminate those answers that you **know** are incorrect. This leaves you with fewer choices. Your chances are then much better.

* Many students fail a section because they do not read the instructions for that section carefully. Every section may have different instructions. Read the set of instructions for each and every section.

* Answers that use absolutes - "always", "never", "only", "wholly", and "forever" are usually incorrect.

* Read the entire question before answering. The second part of the question may change the answer.

* A common mistake is to look for a pattern in the way you answer questions. There is no pattern to the answers on the GED Test.

* When answering paragraph questions:

    a. Scan the questions first. This will give you an idea of the kind of information asked for.

    b. Look at the heading of the paragraph. It tells you what the passage is about.

    c. Skim the passage to get the general idea of the topic.

    d. Look for the topic sentence as you read to find the key idea of the passage.

e. Find the general theme if two or more paragraphs are given.

f. Watch out for opinions and writer's biases.

g. Answer the question from the ideas in the passage. Also, answer it from ideas implied by the writer. Do not answer it from what **you** think the author **should** have said.

h. Assume that the order of the questions may **not** be the same as the order of the paragraph.

DIRECTIONS: Check the **best** answer to complete a statement or answer a question.

1. When answering a question on a multiple choice test item, you should

   _____ a. pick the first answer that appears to be correct.
   _____ b. save time and pick the second or third choice.
   _____ c. read all the possible answers before answering a question.
   _____ d. none of the above

2. The answers on the GED Test are

   _____ a. all true and false.
   _____ b. all multiple choice.
   _____ c. 50% completion and 50% multiple choice.
   _____ d. 50% true and false and 50% completion.

3. Absolute answers such as "always", "never", and "only" are

   _____ a. usually correct.
   _____ b. never correct.
   _____ c. usually incorrect.
   _____ d. always incorrect.

4. Which of the following would you avoid doing when answering a paragraph question?

   _____ a. Skim the paragraph to get the general idea of the topic.
   _____ b. Look at the heading of the paragraph to see what the paragraph is about.
   _____ c. Look for the key idea in the topic sentence.
   _____ d. Answer the questions from your own experience, rather than what's in the passage.

5. Which of the following statements is **true** about taking the GED Test?

_____ a. You should answer the difficult questions first.
_____ b. It is not necessary to read the whole question before answering because the first part of the question is the most important part.
_____ c. Some questions may have two correct answers.
_____ d. Test instructions may vary from section to section.

6. Which of the following statements is **true** about selecting the correct answer to a GED Test question?

_____ a. When you eliminate answers that you know are incorrect, you save time as well as increase your chances of getting the answers correct.
_____ b. If a question appears to have two right answers, choose only the first answer.
_____ c. Leave a question unanswered if you don't know the answer.
_____ d. You should answer easier questions last.

7. The GED Test is scored by

_____ a. the number of incorrect answers.
_____ b. the number of correct answers minus the number of guessed answers.
_____ c. the number of correct answers including the ones which are guessed.
_____ d. the number of unmarked answers.

8. If you aren't sure of an answer, you should

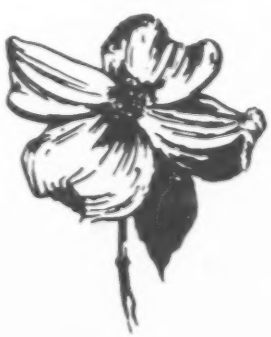
_____ a. choose all of the answers.
_____ b. skip that question and return to it later.
_____ c. leave the question unanswered.
_____ d. choose the first answer.

9. If you put an answer in the wrong answer box, you should

_____ a. cross it out and mark the correct answer box.
_____ b. erase the answer completely and mark the correct answer box.
_____ c. write a note to the test examiner explaining your mistake.
_____ d. get a new answer sheet and begin the test again.

10. The best way to pass the GED Test is to

_____ a. study hard for it.
_____ b. follow important test-taking hints.
_____ c. both of the above
_____ d. only b above



OBJECTIVE: To review skills introduced in 801-803

VOCABULARY

DIRECTIONS: Circle the letter of the correct answer to complete each sentence.

1. A doctor who diagnoses and treats eye diseases is an _____.

   a. optician b. ophthalmologist c. optometrist d. optimist

2. A woman who undergoes a _____ has her baby delivered through an incision in the walls of the abdomen and uterus.

   a. appendectomy b. Caesarean section c. cerebrum d. culture

3. The yellow fluid secreted by the stomach is called _____.

   a. gastric juice b. mucus c. saliva d. nectar

4. The _____, which acts as a lid to the windpipe, keeps food from going down the wrong way.

   a. pharynx b. esophagus c. epiglottis d. larynx

5. The body system which removes waste from the body is called _____.

   a. endocrine b. circulatory c. excretory d. nervous

DIRECTIONS: Complete each sentence with one of the following words.

antibiotics	**cerebellum**	**hemoglobin**	**marrow**	**biceps**
tendons	**sphincter**	**ovaries**	**larynx**	**nutrients**

6. _____ are substances like vitamins and minerals that provide nourishment for the body.

7. _____ is the red substance in the blood that combines with oxygen and carries it throughout the body.

8. _____ kill or stop the growth of harmful organisms.

9. The muscle of the upper arm that bends the elbow is called the _____.

10. The soft material that fills the inside of bones is called _____.

11. _____ are tough cords of tissue that connect skeletal muscles to bones.

12. _____ muscles, which can open or close holes within the body, control the passage of substances.

13. _____ are female reproductive organs which produce eggs.

14. The part of the brain which controls reasoning, memory, thought, sensation, and speech is called the _____.

15. The function of the _____ is to create sound.

CLASSIFICATION

DIRECTIONS: Circle the main word or term in each group.

16. digestive, respiratory, circulatory, system, nervous

17. heart, arteries, circulatory, veins, capillaries

18. pituitary, gland, thyroid, adrenal

19. syphilis, gonorrhea, genital herpes, venereal disease

20. lungs, heart, chest, diaphragm, bronchioles

DIRECTIONS: Circle the word or term which does not belong in each group.

21. plasma, red cells, white cells, ligaments

22. spinal cord, pharynx, medulla, cerebrum, cerebellum

23. optometrist, pediatrician, optician, ophthalmologist

24. urethra, pancreas, intestines, stomach, esophagus, gallbladder

25. veins, arteries, capillaries, saliva, venules

26. testicles, seminal vesicle, prostate, fallopian tubes, penis

27. vitamins, fats, calories, protein, carbohydrates, minerals

28. calcium, iodine, sodium, iron, enzyme, potassium

29. biceps, triceps, tendons, pulmonary, sphincter

30. diaphragm, hinge, ball and socket, pivot, angular

GENERALIZATIONS/DRAWING CONCLUSIONS

DIRECTIONS: Read each group of facts. Then choose the **best** generalization for each group of facts.

Facts

1. Skin tissue protects the body from infections.
2. Muscle tissue moves certain parts of the body by tightening or loosening.
3. Connective tissue supports or binds body parts or internal organs.

31. What generalization can you make about body tissue?

    a. All tissues protect the body from infections.

    b. Various tissues in the body have specific functions.

    c. Connective tissue is the most important tissue in the human body.

Facts

1. Courtney Farlow is attending the Illinois School of Optometry.
2. Gloria Farlow is pursuing a career in dentistry at the University of Illinois School of Dentistry.
3. Falon Farlow is specializing in cardiology at the University of Chicago Medical School.

32. What generalization can you make about the Farlows' career pursuits?

    a. Illinois has the best medical schools in the nation.

    b. Three of the Farlows are interested in the medical profession..

    c. Falon Farlow will make a good doctor.

Facts

1. A 10-ounce can of beer contains 1/2 ounce of pure alcohol.
2. One-and-a-half ounces of 80 proof whiskey in a cocktail contains 1/2 ounce of pure alcohol.
3. A five-ounce glass of wine contains 1/2 ounce of pure alcohol.
4. Pure alcohol is burned up by the human body at an approximate rate of 1/2 ounce an hour.
5. The average person weighing 150 pounds can drink one alcoholic beverage in one hour without a build-up of alcohol in the bloodstream.

33. What generalization can you make about the effect of 1/2 ounce of pure alcohol on the body of the average 150-pound person?

    a. A 12-ounce can of beer contains more pure alcohol than a cocktail made with 1 1/2 ounces of 80 proof whiskey.

    b. A 150-pound person will become intoxicated quicker from drinking a 12-ounce can of beer than from drinking a five-ounce glass of wine.

    c. Whether he drinks a five-ounce glass of wine, a cocktail with 1 1/2 ounces of 80 proof whiskey, or a 12-ounce can of beer each hour, the average 150-pound person will not become intoxicated.

DIRECTIONS: Read each paragraph. Then determine the best generalization which can be made from it.

Small children require 10-12 hours of sleep at night. Many elderly people get by on five or six hours of sleep. One of the functions of sleep is that the resting body goes through a cycle of repair and rebuilding. This repair and rebuilding of cells and tissues is brought about by metabolism. In metabolism, enzymes turn nutrients into energy for growth, repair, action, and body heat.

34. What generalization can you make about sleep requirement and age?

_____

_____

Company A involves all of its employees in decisions regarding the scheduling of work. Workers decide on their own hours. Employees are allowed to choose their own benefit package and enroll their children in the company day-care center. Absenteeism is low. Production is high. The management of Company B, however, makes all decisions regarding their employees' hours and benefits. Suggestions from the workers are definitely not encouraged. Supervisors are requested to report tardiness and the number of breaks taken by their staff. Production and morale are low at Company B, and absenteeism and employee turnover are high.

35. What generalization can you make about the attitude and working habits of workers?

_____

_____

DIRECTIONS: Circle the letter of the **best** conclusion for each paragraph.

36. If you look at your skin with the naked eye, it may appear to be smooth. However, if you look at it through a magnifying glass, you will see numerous tiny, roughlike lines. You may even wonder if you are looking at the same skin.

    a. The skin is not as smooth as it appears to be.
    b. The skin looks rough to the naked eye.
    c. A microscope does not show imperfections in the skin.
    d. The skin is softer than it appears to be.

37. When vegetables such as green beans are steamed for a short time, they lose very little nutritional value. However, when these vegetables are boiled, much of the nutritional value is lost in the liquid.

    a. All vegetables should be steamed.
    b. Boiled vegetables cause poor health.
    c. Steamed vegetables have more food value than boiled vegetables.
    d. Green beans have little nutritional value.

38. All wines do not contain the same number of calories. Three-and-one-half ounces of table wines such as Chablis and Rhine contains about 85 calories. Three-and-one-half ounces of dessert wine such as Muscatel contains about 140 calories.

    a. Table wines have fewer calories than dessert wines.
    b. Dessert wines have more calories than tables wines.
    c. Seven ounces of sherry contains about 280 calories.
    d. all of the above

39. Sickle cell anemia is mainly confined to people of African descent. It is also found among some racial groups who live around the Mediterranean Sea. Tay-Sach's disease is more common among Jewish people. Thalassemia or Cooley's Anemia affects mainly Italians and Greeks. Rh babies and cystic fibrosis affect Caucasians more than any other racial group.

a. Only Black people have sickle cell anemia.
b. Some diseases are more prevalent among certain ethnic groups.
c. There is no cure for Tay-Sach's disease.
d. There is an extremely high rate of cystic fibrosis among Italians.

40. The need for calcium intake continues throughout life. As an example, many elderly people suffer from a condition called osteoporosis. Their bones have lost calcium and have become porous and fragile. This is why you often hear of elderly people breaking a hip when they fall.

a. When the body needs more calcium than it is being fed, it takes it from the bones.
b. When an elderly person falls, he usually breaks a hip.
c. All elderly people have fragile bones.
d. Hipbones are the most breakable bones in the body.

CHARTS/TABLES

DIRECTIONS: Use the chart below to underline the correct answers in parentheses.

BLOOD SUPPLY IN BODY TISSUE

Location	Percentage
Skeletal Muscles	21
Kidneys	19
Digestive Organs	24
Skin	9
Brain	13
Heart (the organ itself)	4
Lungs and Other Organs	10

41. The lungs alone (do, do not) contain 10% of the blood in the body.

42. The kidneys (do, do not) contain as much blood as all of the other organs combined.

43. The digestive organs and brain together (do, do not) contain more blood than the skeletal muscles.

44. The brain (does, does not) contain more blood than the skin.

45. The circulation in the heart itself (does, does not) use the smallest amount of blood of the categories on the chart.

DIRECTIONS: Review the information in the chart below. Then circle T for **true** and F for **false** before each statement.

Blood Type	Can Be Accepted By People With This Blood Type	Can Be Donated To People With This Blood Type
A	A or O	A or AB
B	B or O	B or AB
AB	All Types	Only AB
O	Only O	All Types

46. T F People with Type O blood can donate blood to all types.

47. T F Only persons with Type O blood can receive a transfusion with Type O blood.

48. T F People with Type AB blood can accept only AB blood.

49. T F Type A blood can be used as a transfusion for people with Type AB blood.

50. T F People with Type B blood can accept Type O blood.

GLOSSARY

Courses 701 - 703
Courses 801 - 803

Most of the key words in each course are defined in the context in which they appear. Therefore, not every science vocabulary word in each course is included in the glossaries. Most of the words have been included because they may be challenging to pronounce. Some are included because they may be used in more than one way. A few others are there because they are similar to some other term.

Use the Pronunciation Key as a guide. It shows examples of words in which vowel sounds and other letter combinations occur. It is also a key to using various symbols.

PRONUNCIATION KEY

a	..... apple, cat	g	..... get
ā	..... aim, face, say	j	..... germ
â(r)	.... hair, fare		
ä	..... farm, palm	oi	..... oil, loin
		ou	..... out, owl
e	..... empty, met		
ē	..... even, see, team	sh	..... sharp, fish
ė	..... circle, earth	zh	..... measure, vision
i	..... in, lit	th	..... thin, fourth
ī	..... I'm, like, buy	TH	..... this, smooth
o	..... ox, sock		
ō	..... open, hope		
ô	..... bought, hall		
u	..... up, under		
u̇	..... put, foot		
ü	..... noon, spool		

The symbol (ə) is a schwa. It takes the place of the sound that these letters make:

a as in adult	o as in lemon
e as in happen	o as in second
i as in pencil	u as in further

An accent mark (') follows the part of a word that is stressed when it is pronounced.
Example: cot'ton
In words of several syllables, more than one syllable may be accented. The one to be stressed the most has the longer accent mark.
Example: pre' his tor' ic

GLOSSARY

701 - 703

adapt (ə dapt'), change to fit changing conditions.

algae (al' jē), the simplest form of green plants.

amphibians (am fib' ē ənz), vertebrate creatures partly adapted to water and partly adapted to land.

angiosperm (an' jē ō sperm), literally "covered seed"; flowering plant which has such a seed protected inside a fruit.

antennae (an ten' ē), plural of antenna, the two long slender feelers on the heads of snails, lobsters, and some insects.

arachnid (ə rak' nid), any of a group of animals that includes spiders, scorpions, mites, ticks, and daddy-longlegs.

ascarides (as' kər ədz'), a kind of worm that is an intestinal parasite.

assimilation (ə sim' ə lā' shən), a taking in and absorbing.

asteroids (as' tər oidz'), rocks floating in space.

astronomy (ə stron' ə mē), the study of the universe.

atmosphere (at' məs fēr), all of the air that surrounds the earth.

bacteria (bak tir' ē ə), the smallest one-celled organisms.

barometer (bə rom' ə tr) an instrument for measuring air pressure.

bryophyte (brī' ō fīt'), a higher plant in which there are no veins; belongs to the **Phylum Bryophyta** (fī' ləm brī' ō fī tə).

bud (bud), 1. small swelling on a plant that will grow into a branch, leaf or flower; 2. small swelling that emerges from the eye of a potato to form a new plant.

catalytic converter (kat'l it' ik kən vərt' ər), device on cars that controls unhealthy byproducts from the burning of fuel.

cell membrane (sel mem' brān), outer part of a cell that determines what enters and leaves the cell.

cell wall (sel wôl), the tough outer covering of a plant cell.

Cenozoic Era (sen' ō zō' ik ir'ə), the most recent of three periods of time into which the known history of the world is divided; "The Age of Mammals".

characteristics (kar' ək tə ris' tiks), qualities or features.

chitin (kī' tən), horny outer covering of beetles, lobsters, etc.

chlorophyll (klor' ə fil), the green matter in a plant that produces food from light, water, and carbon dioxide.

chloroplast (klor' ə plast), a body in a plant cell that produces chlorophyll.

chromosomes (krō' mə sōmz'), the threadlike bodies in cells that carry genes which determine heredity.

coelenterates (sə len' tər āts'), a group of sea animals including hydras, sea anemones, and corals.

conifers (kon' ə frz), plants in the gymnosperm group; they bear naked seeds in the shape of cones.

cotyledons (kot'l ēd' nz), the embryo leaves in a plant seed; the first pair of leaves which grow out of a seed.

crustaceans (krus tā' shənz), animals with shells but no backbones, such as lobsters and crabs.

cytoplasm (sī' tə plas'əm), a jellylike substance that holds the various components of a cell.

DNA (dē en ā), deoxyribonucleic acid (dē ox'ē rī' bō nü klā' ik a'sid), the substance that determines the inherited characteristics of any cell.

dicot (dī' kot), seed with two halves.

domain (dō mān'), territory over which a group has authority.

embryo (em' brē ō), undeveloped plant within a seed.

environment (en vī' rən mənt), surroundings.

epidermis (ep' ə der' məs), the outer layer of skin cells on plants and animals.

evaporate (i vap' ə rāt'), change from a liquid or a solid into a vapor.

evolution (e' vəl u' shən), theory of development of plants and animals in response to their surroundings.

extinct (eks tinkt'), life forms which are no longer alive on earth.

fault (fault), position of the earth's crust after part has moved upward and part has moved downward.

fertilization (fer' təl ə zā' shən), the union of a male and a female sex cell to form a new being.

fission (fish' ən), the form of asexual reproduction in which one parent cell divides to form two identical new cells.

flagella (fla jel' ə), whiplike parts that enable algae to move around.

fossil (fos' əl), the hardened imprint or skeleton of an animal or plant; a record of the past.

fungi (fun' gē), the plural of fungus; a group of plants without chlorophyll, such as the mushroom, mold, or mildew.

galaxy (gal' ak sē), a large group of stars.

gamete (gə mēt'), the reproductive cell of a male or a female.

gene (jēn), the tiny part of a chromosome that determines the inheritance of some particular trait.

genus (jē' nəs), a group of related plants or animals that rank below a family and above a species.

germination (jər' mə nā' shən), the sprouting of a seed.

gymnosperm (jim' nō sperm), literally "uncovered seed"; naked seeds such as pinecones.

habitat (hab' ə tat), place where a plant or animal lives.

hydrosphere (hī' drə sfir), the waters of all the rivers, lakes, and oceans on the planet.

invertebrates (in ver' tə brātz'), animals with no spinal column.

kingdom (king' dəm), the largest category of biological classification. Usually thought of as consisting of plants and of animals. Also contains the classification of protists.

locomotion (lō' kə mō' shən), the act of moving from place to place.

maggot (mag' ət), the legless, wingless, soft-bodied first life stage of a fly.

magma (mag' mə), melted rock beneath the surface of the earth.

mammals (mam' əlz), animals that produce milk for their young.

mantle (man' tl), rocky layer beneath the earth's crust.

marsupials (mar su' pē əlz), mammals whose young do not fully develop in the womb and are not attached by a placenta; females carry young in a pouch.

meiosis (mī ō' səs), sexual reproduction, which requires a male and a female cell to produce offspring.

Mesozoic Era (mes' ō zō' ik ir'ə), the middle of three periods of time into which the known history of the world is divided; "The Age of Reptiles".

metamorphosis (met' ə môr' fə sis), complete change in appearance. When a caterpillar changes into a butterfly or moth, it has undergone a metamorphosis.

meteorologist (mē' tē ər ol' ə jist), person who studies the weather.

mitochondria (mīt'ə kan' drē ə), bodies within a cell but outside the nucleus that produce energy for the cell.

mitosis (mī tō' sis) asexual reproduction by which one cell divides into two new cells.

monocot (mon' ō kot), seed which is not divided.

nucleolus (nu klē' ələs) the part of a nucleus that controls the processing of proteins.

nucleus (nu' klē əs) the part of a cell that directs the cell's activities.

orbit (or' bit), the curved path of a planet, satellite, etc., around another body in space.

Paleozoic Era (pā' lē ō zō' ik ir' ə), the first of three periods of time into which the known history of the world is divided; "The Age of Ancient Life".

palisades (pal ə sādz'), the cells just below the upper epidermis of a leaf.

photosynthesis (fō' tō sin' thə səs), the process by which a plant cell makes food.

phyla (fī' lə), plural of phylum.

phylum (fī' ləm), a primary division of plant and animal kingdoms, consisting of one or more classes.

pistil (pis' təl), the sexual organ of a female plant.

placenta (plə sen' tə), a temporary organ that develops to link an offspring developing in the womb with some of its mother's body systems.

placentals (plə sen' tls), mammals whose young develop fully in the womb and are attached to the mother by a placenta.

plate (plāt), large part of the earth's crust and upper part of the mantle; makes up ocean floors and carries continents.

pollination (pal' ə na^{i} shən), the process by which pollen (male plant sex cells) is tranported to ovules (female plant sex cells).

pollutants (pə lu' tənts), hazardous substances that threaten health, safety, or cleanliness.

pollution (pə lu' shun), the presence of hazardous chemicals and foreign materials in air or water.

precipitation (pri sip' ətā^{i} shən), any form taken by moisture in the air: dew, rain, hail, snow, etc.

predator (pred' ə ter), an animal that hunts other animals for food.

protists (prō' tists), life forms other than plants or animals which have characteristics of both.

regeneration (ri jen' ər a^{i} shən), ability of plants or animals to replace or repair a worn out or damaged part of themselves.

reptiles (rep' tīlz), cold-blooded animals with backbones, scales, and well-developed lungs.

rhizoids (rī' zoidz), structures that carry out the functions of roots, stems, or leaves in plants (such as moss) that lack them.

ridge (rij), long, narrow upper part of a plate.

rotation (rō tā' shən), the spinning of the earth on its axis.

runner (run'ər), long stem that grows along the ground or just below it from a plant.

smog (smag), mixture of smoke and fog.

species (spē' sēz), a group of plants or animals that have certain permanent characteristics in common and are able to interbreed.

spongy (spun' jē), the cells below the palisade cells in a leaf.

spores (sporz), seeds that develop on simple plants such as mushrooms and mold.

stamen (stā mən), the sexual organ of a male plant.

stigma (stig' mə), the part of the pistil in a female plant that receives the pollen.

stimuli (stim' ū lī), plural of stimulus, which is something that sets an action into motion.

stomates (stō' mātz), tiny openings in the lower epidermis of a leaf through which gas and water pass.

style (stīl), the stemlike tube of the pistil of a flower.

trachea (trā' kē ə), tube.

tracheophyte (trā' kē ō fīt'), a higher plant which has a vascular system; belongs to the Phylum Tracheophyta (fī' ləm trā' kē ō fī' tə).

trait (trāt), a characteristic.

trench (trench), the place at which one geological plate is pushed underneath the other.

trichinae (tri kī' nē), the plural of trichina; a worm that is a muscle parasite.

universe (yu' nə vers'), all things that exist in space: planets, stars, etc.

vacuole (vak' ū ōl'), a space within a cell that is a storage place for food or water.

vapor (vā' pr), water particles in the air.

vascular (vas' cū lər), having veins.

vegetative propagation (veg' ə tā' təv prop' ə gā' shən), the form of asexual reproduction in which a new plant can be started from a part of a plant.

vertebrates (vər' tə brātz), animals that have a spinal column.

weather (we' THr), combination of wind, moisture, temperature, and air pressure in the atmosphere.

zygote (zī' gōt), the new cell that forms as a result of the union of an egg and a sperm cell.

abdominal cavity (ab dom' ə nəl kav' ə tē), the part of the body which contains the stomach, intestines, and other vital organs.

anatomy (ə nat' ə mē), the science of the structure of plants and animals.

anesthesiologist (an' es thē' zē ol' ə jəst), a person who is trained to induce temporary loss of feeling during surgery.

antibiotic (an' ti bī ot' ik), a substance such as penicillin produced by a living organism that kills or weakens germs.

aorta (ā ôr' tə), the main artery that transports the blood from the left side of the heart to all parts of the body except the lungs.

artery (ar' tər ē), any one of many tubes that transport blood from the heart to all parts of the body.

auricle (ôr' ə kəl), the chamber of the heart that receives blood from the veins and then forces it into the ventricle.

autonomic (ô' tə nom' ik), related to the part of the nervous system which controls involuntary reactions.

axon (ak' son), the long tail of a nerve cell that carries impulses away from the body of the cell.

biceps (bī' seps), the large muscle in the front of the upper part of the arm.

bronchi (brong' ki), the two large branches of the trachea. One of the branches goes to each lung.

Caesarean section (si zar' ē ən sek' shən), type of surgery which involves a baby being delivered through an incision in the wall of the the abdomen and the uterus.

caffeine (kaf' ēn'), a stimulating drug that is found in some beverages and some prescription and nonprescription medicines.

capillary (kap' ə lar' ē), the smallest of the blood vessels. A network of capillaries carries nutrients from arterioles to tissues and waste from tissues to venules.

cardiologist (kar' dē ol' ə jəst), a doctor who specializes in diseases of the heart.

cerebellum (ser' ə bel' əm), the part of the brain which controls muscle movement and steadiness.

cerebrum (sə rē' brəm), the part of the brain that is the center of reasoning, memory, thought, speech, and sensation.

cranium (krā' nē əm), that part of the skull which houses the brain.

dendrites (den drīt'z), fingerlike extensions at the receiving end of a nerve cell. They receive messages from nearby nerve cells.

dermatologist (dər'mə tôl' ə jist), a doctor who specializes in the structure, functions, and diseases of the skin.

diaphragm (dī' ə fram), a sheet of muscles that makes up the floor of the chest. It separates the chest cavity from the abdominal cavity.

dorsal (dôr' səl), relating to the back.

embryo (em' brē ō), 1. an animal or human being at its earliest stages of development before hatching or birth; 2. undeveloped plant inside a seed.

endocrine gland (en' dō krən or en' dō krin), a gland such as the thyroid or the spleen that produces secretions which pass directly into the bloodstream or lymph rather than into a duct.

enzymes (en'zīmz), substances in raw foods and living cells that cause a chemical reaction but are unchanged themselves.

epiglottis (ep' ə glot'is), a fold of membrane that covers the entrance to the trachea during swallowing to prevent food and drink from entering the lungs.

esophagus (e sof' ə gəs), the tube through which food passes from the throat to the stomach.

excretion (ek skrē' shən), the discharge of waste material from the body.

extensor muscle (ek sten' sər), a muscle such as the triceps which stretches and contracts to permit movement.

extremities (ek strem' ə tēz), the hands and feet.

fallopian tube (fə lō' pē ən), either of a pair of tubes that guide the egg from ovary to uterus.

flexor muscle (flek' sər), a muscle such as the biceps located in front of the upper arm. It pulls the lower arm forward causing it to bend or flex.

genital herpes (See herpes simplex).

glycogen (glī' kə jən), a starchlike carbohydrate stored in animal tissues and the liver. It is converted into glucose when needed.

gynecologist (gīn' ə kol' ə jist), a doctor who specializes in the diseases and hygiene of women.

hemisphere (hem' ə sfir), half of a rounded object. The **left hemisphere** of the brain controls voluntary movement on the right side of the body. The **right hemispere** controls voluntary movement on the left side of the body.

hemophiliac (hē' mə fil' ē ak), a person who suffers from a disorder in which blood clotting is slow to occur. This disorder makes it difficult to stop bleeding even after a minor injury.

hemotologist (hē' mə täl' ə jəst), a doctor who specializes in blood disorders.

herpes simplex (hər' pēz sim' pleks), a virus disease in which groups of watery blisters form on the skin or mucous membranes. **Type I, labial herpes**, affects the mouth and is not a venereal disease. **Type II, genital herpes**, affects the sex organs and is a venereal disease.

hormone (hôr' mōn), a chemical that works in a part of the body other than where it is made.

inorganic (in' ôr gan' ik), not plant or animal; mineral.

intravenous (in' trə vē' nəs), by way of a vein. Usually when a very sick person cannot digest food, glucose is injected into the body intravenously.

labial herpes (See herpes simplex.).

larynx (lar' ingks), the upper end of the windpipe where the vocal cords are located.

ligament (lig' ə mənt), a band of tough fiber that connects bones and keeps body organs in place.

lymph (limf), an almost colorless liquid substance in body tissues which bathes and nourishes these tissues.

marrow (mar' ō), the soft tissue which fills the inside of most bones.

medulla (mi dül' ə), the part of the brain stem which controls involuntary functions such as heartbeat, coughing, swallowing, and breathing.

mucous membrane (myü' kəs), the lining of cavities such as the nose and throat that are open to the outside of the body.

mucus (myü' kəs), a slippery substance that is secreted by the mucous membranes to moisten and protect.

neurologist (nü rol' ə jəst), a specialist in the disorders of the nervous system.

nutrient (nü' trē ənt), a substance that provides nourishment.

obstetrician (ob' stə trish' ən), a doctor who specializes in childbirth.

ophthalmologist (of' thal mol' ə jəst), a doctor who specializes in the structure, function, and diseases of the eyes.

optician (op tish' ən), a person who makes and sells lenses and eyeglasses.

optometrist (op' tom' ə trəst), a person who examines the eyes and prescribes corrective lenses for visual defects.

orthopedist (ôr' thə pē' dəst), a surgeon who specializes in deformities and diseases of the bones and joints.

ossification (os'ə fə kā' shən), the process of changing into bone. The soft part of a baby's skull undergoes ossification as he gets older.

ovulation (ov' yə lā' shən), the process by which an ovary releases a mature egg about every 28 days.

oxidation (ok' sə dā' shən), the process by which oxygen combines with another element to form a new substance.

palate (pal' it), the roof of the mouth.

pancreas (pan' krē əs), a gland near the stomach which aids digestion. The pancreas secretes insulin into the blood and pancreatic juice into the small intestine.

parasympathetic (par' ə sim' pə thet' ik), the operating condition of the autonomic nervous system which regulates the vital organs such as the heart, blood vessels, lungs, and kidneys. The parasympathetic condition counteracts the sympathetic condition which operates when we feel strong emotion such as fear or anger.

pediatrician (pē' dē ə trish' ən), a doctor who specializes in the care and diseases of infants and children.

peripheral nervous system (pə rif' ər əl), the system which is involved in body action and decision. It contains twelve pairs of cranial nerves extending from the brain and 31 pairs extending from the spinal cord.

pharynx (far' ingks), a cavity located at the back of the mouth where the passage to the nose, lungs, and stomach begin.

pituitary gland (pə tü' ə ter' ē), a small oval-shaped endocrine gland located near the bottom of the brain. This gland secretes growth hormones and controls many functions of the body.

prostate gland (pros' stāt), a gland which in combination with the seminal vesicle produces semen.

pulmonary (půl' mə ner' ē), relating to the lungs.

remission (ri mish' ən), inactivity.

salivary glands (sal' ə ver' ē), glands that produce liquid in the mouth to keep it moist, help in chewing, and begin digestion.

scrotum (skrō' təm), a pouch of skin that contains the testicles.

seminal vesicle (sem' ə nəl ves' ə kəl), a small cavity which secretes a fluid which combines with the fluid from the prostate gland to produce semen.

sphincter (sfingk' tər), a round muscle that surrounds an opening in the body. This muscle can contract to close the opening.

sympathetic (sim' pə thet' ik), the condition of the autonomic nervous system which operates when a person feels strong emotion. It prepares the body for action.

tendon (ten' dən), a strong cord of tissue that joins a muscle to a bone or some other body part.

testicles (tes' tə kəlz), glands that produce the sperm in a male.

tetracycline (te' trə sī' klēn), an antibiotic which destroys or weakens germs in the body..

thorax (thôr' aks), the chest; part of the body between the neck and abdomen. In an insect is the second division of the body, between the head and the abdomen.

trachea (trā' kē ə), the windpipe; the passage by which air is transported from the throat to the lungs.

transfusion (tran sfyü' zhən), the tranfer of blood from one person to another.

triceps (trī' seps), the large muscle at the back of the upper arm which straightens the arm.

uterus (yüt' ə rəs), a small hollow female organ (also called the womb) which houses and nourishes the offspring until it's time for it to be born.

vas deferens (vas def' ə renz), tubes by which the sperm leave the testicles during an orgasm.

ventral (ven' trəl), abdominal; the side where the belly is.

ventricles (ven' trə kəlz), the pair of chambers of the heart that receive blood from the auricles and force it into the arteries.

venule (vēn' yül), one of the tiny veins which connects capillaries with the veins.

vertebrae (ver' tə brā), bones that make up the backbone; plural of vertebra (ver' tə brə).

villi (vil' ē), minute, fingerlike parts that grow out of the lining of the small intestine.